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Abstract

Whilst green homes have been constructed by housing developers in Malaysia, developers should determine how satisfied homeowners are with their green homes. This paper first reviews data from a survey to determine the satisfaction level of homeowners towards their residence in terms of green features in Iskandar Malaysia. Next, factor analysis is carried out to identify benefits that motivate households to own green homes, and then followed by logistic regression analysis to determine the effects of motivators on housing satisfaction. Results show that homeowners are most satisfied with the green features of high ceiling, North–South orientation, double-glazed panel glass doors and windows, solar panel system and landscaped parks with facilities. Rain water harvesting system and low-flow water fixtures, on the other hand, are the least satisfied green features among homeowners. Four motivators are found that describe households' belief about green homes: 'Financial Incentives', 'Healthy and Sustainable Environment', 'Energy Efficiency' and 'Livability'. The findings also demonstrated that the extent of housing satisfaction may depend on what motivates homeowners to own green homes. It would seem that house buyers do not just demand a typical house to stay in but also sustainable houses that do not compromise the environment.

Keywords (separated by '-')	Green home - Housing satisfaction - Motivation - Malaysia
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Satisfaction and Motivation of Homeowners Towards Green Homes

Teck-Hong Tan

Accepted: 11 March 2013

Abstract Whilst green homes have been constructed by housing developers in Malaysia, developers should determine how satisfied homeowners are with their green homes. This paper first reviews data from a survey to determine the satisfaction level of homeowners towards their residence in terms of green features in Iskandar Malaysia. Next, factor analysis is carried out to identify benefits that motivate households to own green homes, and then followed by logistic regression analysis to determine the effects of motivators on housing satisfaction. Results show that homeowners are most satisfied with the green features of high ceiling, North–South orientation, double-glazed panel glass doors and windows, solar panel system and landscaped parks with facilities. Rain water harvesting system and low-flow water fixtures, on the other hand, are the least satisfied green features among homeowners. Four motivators are found that describe households' belief about green homes: 'Financial Incentives', 'Healthy and Sustainable Environment', 'Energy Efficiency' and 'Livability'. The findings also demonstrated that the extent of housing satisfaction may depend on what motivates homeowners to own green homes. It would seem that house buyers do not just demand a typical house to stay in but also sustainable houses that do not compromise the environment.

Keywords Green home · Housing satisfaction · Motivation · Malaysia

1 Introduction

Being a tropical country with abundant sun and rain and the prevailing southwesterly and northeasterly winds, there are many opportunities for developers in Malaysia to construct green buildings. In response to the growing interest in enhancing environmental

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sustainability, the Malaysian government together with the Association of Architects Malaysia and the Association of Consulting Engineers Malaysia in 2009 launched the environmental rating system for commercial and residential properties to promote the green culture among industry players in the country. Under the assessment framework, developers are encouraged to design and construct properties that promote energy and water efficiency, indoor environmental quality, sustainable site planning and management, and innovative processes.

Going green has become trendy among households, and many people are taking up this trend by adopting an eco-friendly lifestyle. One may be enticed to raise the question on why accentuation is being placed on green homes. This is possibly because developing environmentally sustainable and green home is important in the efforts to mitigate climate change (Lovell 2004; Seelig 2011; Tan 2013). With the government's recent move to promote the adoption of energy-saving measures for properties, many green homes are built in the country (Green Building Index 2013). However, to date, less empirical works has been conducted to evaluate the performance of the quality of green homes in the country. Therefore, the objective of this paper is to augment the work of Eves and Kippes (2010) by examining responses to the variation between the expectations and realities of key green home features as experienced by homeowners who reside in their green homes for at least 6 months.

In order to evaluate the performance of green homes, the concept of satisfaction has become the most widely used in evaluating housing conditions (Lu 1999; Adriaanse 2007; Erdogan et al. 2007). Housing satisfaction is known as an important component of households' general quality of life. It has been used as a key indicator of households' perception of general quality of life. There have been a number of studies on housing satisfaction in Malaysia, and these studies focused mainly on conventional homes. No study has been done to assess the households' satisfaction with green homes in Malaysia. Increasing interest is now shown towards to study of how households think of their green housing and how it affects their lives. It is interesting to gain an understanding on households' satisfaction in green homes as an evaluation of the performance of green homes. The development of green homes requires continuous studies of housing satisfaction needs to examine homeowners' satisfaction level with different types of green attributes; therefore, greater knowledge of attributes that influence homeowners' behavior could lead to a better understanding and prediction in determining homeowners' needs and preferences.

For the green commercial properties, such properties have shown an increased market value in terms of higher sales, higher rental rates, increased occupancy and lower turnover, compared to comparable conventional buildings (Fisk 2000; Miller et al. 2008; Gunderson 2006; Furst and Mc Allister 2009; Bond 2010). Although there are only a few studies in literature that examine the benefits of green residential properties, it is reasonable to believe that living in environmental sustainable homes could provide tangible and intangible benefits to homeowners.

There are various economic growth areas developed by the Malaysian government recently. The adoption of low carbon cities has been incorporated in the development plan of economic growth areas. One of them is the Iskandar growth corridor, which covers the southern part of Johor State. Johor is the southernmost state in Peninsular Malaysia and third fastest-growing state after Selangor and Penang (see Fig. 1). Iskandar is ideally suited for the purpose of this research because it is Malaysia's proposed model of a socio economically and environmental sustainable development zone with excellent connectiv-

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

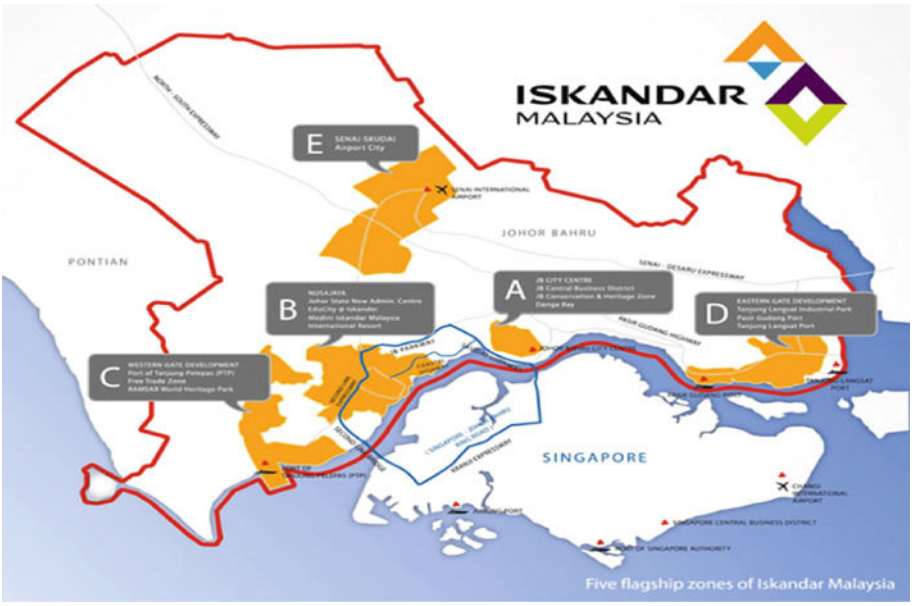

Fig. 1 Iskandar Malaysia *Source*: http://latitudes.nu/iskandar-a-bellwether-for-improving-relations-between-singapore-and-malaysia/

Fig. 2 Project A, Project B and Project C in Iskandar, Malaysia *Source*: http://thissit.com/Projects-Taman-Setia-Tropika-Project-37.aspx

ity, infrastructure services, and environmental sensitivity (Rizzo and Glasson 2012). Furthermore, Iskandar has identified as a pioneer metropolis to promote the use of renewable energy and advanced green technology (Fig. 2).

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

2 Literature Review

2.1 Housing Satisfaction

Measures of housing satisfaction provide additional insight regarding individuals' experience with housing, and can be used to evaluate the quality of all types of housing (Natham 1995). Housing satisfaction is considered a very useful criterion in the evaluation of green housing because it indicates the general level of success, measures the users' affective and cognitive responses and point out the tiresome aspects of green dwelling.

There have been different approaches to conceptualize housing satisfaction. In the purposive approach, satisfaction is conceptualized as a measure of the degree to which the environment facilitates or inhibits the goal of the user (Canter and Rees 1982). This approach, which is rooted in a cognitive view, emphasizes on goals or associated activities in relation to the attributes of the physical environment. For example, a household may live in a green home with the purpose of improving the quality of life as well as cost savings and if these intentions are met, it is possible that they could gain a high level of housing satisfaction.

Households are not only goal-oriented but they also value affective relations with the housing situation. The aspiration gap approach is the more common conceptual framework of housing satisfaction, describing housing satisfaction as being a comparison between households' actual and desired housing and neighborhood situations (Galster 1987). Following this approach, a high degree of congruence between actual and desired housing and neighborhood situations is an indication of a high rate of satisfaction because the housing and neighborhood conditions met households' needs and aspirations.

Based on previous literatures, there is little doubt that objective and subjective measures of housing attributes are significant factors of housing satisfaction (Lu 1999; Roper et al. 2009; Amole 2009; Tan 2012a). Objective measures refer to the actual measurements, such as the presence, the lack of, or quantities of attributes, while subjective measures refer to perception, emotions, attitudes and intentions towards the housing attributes. This paper focuses only on objective measures of green housing attributes to assess the performance of the quality of green homes.

2.2 Benefits that Motivate Households to Own Green Homes

There is a growing interest in constructing houses that incorporate sustainable and green features (Green Building Index 2013). Houses are considered green when they use environmentally friendly materials for construction. Also, green homes use renewable energy technologies, water conservation devices, solar panels, rainwater harvesting system, energy efficiency appliances and passive design for natural cooling and heating (Toowoomba Regional Council 2010).

It is crucial to ascertain the factors that motivate homeowners to buy a new home that incorporates sustainable measures and technologies. Homeowners may choose to own green homes because they may expect returns and rewards of owning such homes. As a matter of fact, green homes incorporate features that save energy and resources such as rainwater harvesting system, tropical landscaping, taller buildings, photovoltaic panels and environment-friendly or recycled materials, could reduce heat transmission and promote cross ventilation (Tan, 2013).

There is a growing interest in the physical structure of environmentally sustainable buildings (Eicholtz et al. 2008; Furst and McAllister 2011). This is because the built

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

environment accounts for an estimated 30–40 % of the total primary energy consumption and green house gas emission globally (Bond 2010). As pointed by Feliciano and Prosperi (2011), a significant share of green house gas emission from the residential sector could be due to fast and cheap construction practices without employing energy-efficient measures and renewable energies. There has been an increasing focus on energy efficient construction methods in the built environment. In the past, housing developers have relied on conventional methods in building houses. However, conventional methods are unsustainable in the long run. Therefore, sustainable features in building homes are an important contributor to achieve a healthy and sustainable environment. Green homes generally have low carbon footprints, which is particularly important in the construction industry as this industry is a major consumer of raw materials (Lovell 2004; Feliciano and Prosperi 2011).

Housing, categorized as a social service, is more than just bricks and mortar. In fact, housing is a building block of a community of households. A high quality of green housing needs to be designed to help households develop a sense of community. Similarly, households are motivated to own green homes that could attain a desired level of livability and promote development that is in line with the principles of sustainability. Livable communities generally incorporate high standards of transportation, infrastructure and security to enhance healthy living, work and play (Tan 2012b). Another characteristic of livable community is that there is a high level of cooperation and consensus among residents because they tend to be involved in community affairs (Harkness and Newman 2003; Vera-Toscano and Ateca-Amestoy 2008).

Although the cost of developing a green building may be more than that of a conventional building, numerous studies have proven the financial advantages of green buildings for both residential and commercial buildings. The most commonly cited financial benefits of green building are the increase in rental income as well as the property value (Furst and Mc Allister 2009; Miller et al. 2008; Pitts and Jackson 2008; Yu and Tu 2011). Green homes generally use key resources like energy and water more efficiently than traditional homes, which results in savings on utilities bills (Ling and Gunawansa 2011). As a result, these externalities promote the overall reputation of the property.

2.3 Research Questions

Although public acceptance of low carbon emission housing has been steadily increasing, has this acceptance led to high level of satisfaction among homeowners who are currently residing in such homes? In order to better understand homes incorporating green and sustainable features in the Malaysian context, the research questions were as follow:

- Which specific green features are households satisfied with?
- What are the benefits that motivate households to own green homes?

It is reasonable to believe that the degree (likelihood) of housing satisfaction may depend on the motivation of owning green homes as motivation has been an important reason in the explanation of homeownership (Tan 2012a). However, there is little empirical evidence demonstrating how these motivations predict housing satisfaction in the context of green homes. Therefore, this paper assesses whether these motivations show signs of statistically significant predictors of satisfaction with green homes.

- To what extent do motivations of owning green homes predict housing satisfaction?

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

3 Methods

While green homes have been constructed by housing developers in United States, Europe and Australia, it is still at an early stage in Malaysia. The country's first green home was built in 2007. In recent times, housing developers from the state of Selangor has made their way south to Iskandar, bringing with the more sophisticated products and concepts, such as green homes. It is interesting to determine the extent to which homeowners from the state of Johor are satisfied with green homes and uncover the green features that they are not satisfied with.

This study is useful because it provides a case study for green development since there are limited examples of best practices for sustainable development in the country. This paper only focuses on three green housing projects developed by one of leading developers in the country. These three townships are located at the center of Iskandar growth corridor.

The green homes in these three townships are designed and constructed with the following green features:

- Rainwater harvesting system is installed to collect rainwater from the sloping rooftops for irrigating plants and vegetation.
- The use of low carbon-emitting construction materials, such as the low volatile organic compound (VOC) paints, recycled terracotta bricks and raw concrete, recycled green rated gypsum plasterboards, recycled planks for the main gate and skylights for natural lighting.
- Installation of solar roof shingles to tap natural power resources to generate solar energy for green home.
- Glass doors and windows are positioned at appropriate areas of the house to allow daylight to enter the house.
- The homes are constructed with double-glazed glass panels to reduce heat transmission into the building.
- The homes are equipped with power saving lights and energy efficient appliances.
- Low-flow water fixtures are installed to lessen the consumption of water.
- 13 feet high ceilings in the house allows ample natural lighting and cross ventilation.
- The homes are situated in the North–South position to avoid heat from direct sunlight.
- Roofs are fitted with materials that reduce solar heat.
- Family recreational facilities are provided in landscaped parks.
- The homes are within gated and guarded communities that come with security personnel and facilities.

This survey only focused semi-detached and detached houses in these townships. Reason being the Malaysian government recently mandated that builders of semi-detached and detached houses have to put in place energy-efficient features, such as rainwater harvesting system. There is no much difference in terms of housing conditions for both types of housing; therefore, housing characteristics are generally constant in this survey.

The data for this study is primary data. Questionnaire is selected as the instrument to collect primary data from homeowners. The sampling frame for any probability sample is a complete list of homeowners who own green homes in Township A, B and C. There are total of 295 green homes being built at this point by the developer. Questionnaire was distributed to 295 green home owners with the assumption that the sample was representative of the population. All respondents were asked to return their survey forms to the management office of each township. However, only 116 responded and returned their

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

Table 1 Breakdown of the sample

Project	Population	Sample	%
Project A	60	28	24.1
Project B	126	53	45.7
Project C	109	35	30.2
Total	295	116	100.0

complete survey forms to the management office. The response rate of 40 % can be attributed to the enthusiastic support from the developer (see Table 1).

This paper first determined a list of green features that are provided to homeowners after residing in homes incorporating sustainability measures for at least 6 months and asked them to rate the green features on a scale of 1 (strongly dissatisfied) to 5 (strongly satisfied) to express the extent to which they are satisfied or dissatisfied with the different types of green features.

Next, Factor Analysis (Principal Component Analysis and Varimax rotation) was used to examine whether the survey items relating to the benefits that motivate households to own green homes can be grouped into a number of motivators to create an index for motivations of owning green homes.

The measures of motivators were derived with slight modifications from several studies of Raisebeck and Wardlaw (2009), Ling and Gunawansa (2011), Tan (2012a) and Tan (2013). Respondents were asked as to how agreeable they were with these motivations of owning green homes, ranging from 1 for 'strongly disagreed' to 5 for 'strongly agreed'. Furthermore, in-depth interviews were conducted to ascertain the expectations and attainment of respondents and to discuss issues in relation to green and sustainable features.

The last part of the analysis was to use logistic regression models to determine the effects of motivators on green housing satisfaction. The outcome variable in the analysis was a categorical variable as respondents were asked to rate the overall satisfaction level of their green home on a Likert-scale, where 1 = strongly dissatisfied; 5 = strongly satisfied. In order to perform logistic regression, the response of 1, 2 and 3 was categorized as no (0) and the response of 4 and 5 was grouped as yes (1). The independent variables were the composite indices of motivators. Consequently, two logistic regression analyses were performed. The first equation was to assess the effect of motivations on the likelihood of being highly satisfied with the green home and the second one was to examine whether these motivators predict green housing satisfaction while controlling for differences in three housing projects and socio-demographic characteristics of respondents, such as education attainment and marital status.

4 Results and Discussion

4.1 Satisfaction Level of Green Features

As expected, respondents made a purchase decision to own green homes that could lead to an important personal outcome. From the study, it seems that respondents are interested in the experiences they can gain from using the product. The following tables were to rank the satisfaction level of the respondents in Iskandar Malaysia based on specific green features

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

Table 2 Top ten most satisfied green features

Rank	Green features	Mean	SD
1	13 feet high ceiling design in the house	4.2414	.90044
2	North–South orientation	4.1983	.94381
3	Green park with gym facilities	4.1293	.80790
4	Solar panel system in the house	4.0517	.80049
5	Cross ventilation in the house	3.9483	.67043
6	Double-glazed panel glass door and window	3.9483	.97664
7	Water features in the neighborhood	3.9397	.79442
8	Low VOC paint used in the house	3.8103	.90327
9	Compound lighting (LED light)	3.7845	.77802
10	Rockwool heat insulation in the roof	3.6466	1.18141

of the property (mean and standard deviation scores were calculated). According to this survey, the top ten most satisfied green features were: (Table 2).

In this survey, respondents generally focused more on green features to improve indoor air quality such as high ceiling, North–South orientation, double-glazed panel glass door and window and linear parks with recreational facilities. It has been found that respondents paid much attention to homes with better ventilation, lighting and view of the outdoors, which could result in high levels of satisfaction. Respondents generally agreed that high ceiling homes allow cross ventilation for a cooling ambience, and homes oriented in the North–South position could reduce heat by minimizing direct sunlight into the homes. Furthermore, glass door and window that could allow the natural light to come through and serve as ventilators could be used to lessen the usage of electricity. There is also evidence that respondents were motivated to use solar panels to capture and store the heat from the sun. Solar power would appear to be a good source of renewable energy for Malaysia as the country is bathed in sunlight. The results also suggested that respondents will pay a premium to live in a home with lush and landscaped greenery as the trees and shrubs enveloping the development could act as the natural shades to cool down the house naturally and reduce the need for cooling systems.

The top five least satisfied green features are: Table 3.

In these three projects, rainwater tanks are installed to capitalize on nature's offering by collecting rainwater from the sloping rooftop for irrigating plants and vegetation. However, respondents in the survey were not satisfied with the rainwater harvesting system that uses recycled water for watering plants even though this could result in a significant reduction of water consumption. These viewpoints are supported from the in-depth interview with few respondents in describing the practicality of using the rainwater harvesting system. One respondent in the interview explained: "The water collected is so dirty that I cannot use to flush the toilets and irrigate the garden". Echoing these sentiments another respondent said: "It is a good system but its practicality needs some work". He added further: "The storage tank will dry out when there is no rain for a week." Judging from the mixed responses to this system, it seems that much has to be done with regard to increasing the practicality of this system. It appears that there is a need to improve the quality of the rainwater filter collector which could effectively separate the water from leaves and other debris. Furthermore, the system should come with a proper back-up in case there is no rain. For an example, if the water level falls to a certain percentage of capacity, the control panel

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

Table 3 Top 3 least satisfied green features

Rank	Green features	Mean	SD
1	Rain water harvesting	2.8448	.98337
2	Low-flow water fixtures	2.8879	1.16299
3	Recycled content ceramic wall and floor tiles	3.1552	.71753

will be triggered to open a valve to connect to the water from the domestic water storage tank which will keep the system running until it rains again.

According to this survey, it showed that low-flow water fixtures could not function as good as the normal high-flow water fixtures. Low-flow water fixture is a water efficient fitting to reduce water usage by reducing the flow of water, but respondents generally complain about these low flow water features provided by the developer. As few respondents pointed out: "We need long waiting time to fill up a bottle of water and the situation has gotten even worse when the water pressure is low due to clogged connecting water pipes'. Also, households in the survey were not satisfied with the wall and floor tiles that are made of recycled materials. From the above findings, it would seem that marketing a green home is not without its share of challenges. Housing developers are required to undertake continuously long-term engagement programs to promote and raise awareness about environmental friendly home features.

4.2 Motivations of Owning Green Homes

The next stage of analysis is to investigate factors influencing motivation of owing green homes. Before examining the motivations of owning green housing, a total of 24 survey items were entered into factor analysis. 6 items were discarded for further analysis after considering items with factor loadings of 0.50 or more. The factor analysis performed finally yielded 4 factors with an eigenvalue of one or more and explained 68% of the variance.

It is interesting to note that the first factor which accounted for the largest variance was related to 'Financial Incentives'. This factor ($\alpha = 0.875$) comprised of 4 statements with 28.217 % of variance with an eigenvalue of 5.079. Of the 4 statements, the statement 'The green homes provide cost savings on future electricity bills' was the most important statement with a loading of 0.808. The next highest statement was 'The value of green homes will increase' with a loading of 0.797. This was then followed by 'The homes incorporating sustainable measures could fetch higher rental' and 'The green homes provide cost savings on future water bills' with loadings of 0.787 and 0.630, respectively. In line with the findings of Ling and Gunawansa (2011) and Raisebeck and Wardlaw (2009), households are motivated to own green homes because such homes could have significant operational savings in utilities. Despite the high development cost of a green home, respondents generally believe that the savings in utilities could make the cost of owing green homes cheaper in the long run. Furthermore, households in this survey generally agreed that green-accredited homes are able to fetch higher premium in terms of capital value and rental rates as compared to non-green compliant homes.

The second important factor found in this study was termed 'Healthy and Sustainable Environment' and consisted of 5 statements ($\alpha = 0.817$) with 19.562 % of variance with an eigenvalue of 3.521 that capture the capacity of green homes to reduce green house gas emission for a healthy and sustainable environment. In this survey, 'The green home uses

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

renewable energy as its power source', 'Many green building products have longevity, thus making maintenance expenses more manageable', 'The homes should be built with sustainable construction materials', 'Our activities at home have an impact on the increased energy consumption' and 'Owning a green home is able to demonstrate my responsibility to the community' were associated with emission reduction for a healthy living environment, which have factor loadings of 0.720, 0.652, 0.646, 0.621, and 0.621, respectively. As mentioned earlier, houses are responsible for almost a third of total carbon emissions. A significant share of energy consumption and CO_2 emission can be reduced through utilization of renewable energy and lifestyle and behavior changes at home (Feliciano and Prosperi 2011). Respondents generally agreed that green homes are designed to save energy and resources and to minimize the emission of toxic substances throughout its lifecycle.

'Energy Efficiency' was the third motivator and consisted of 5 statements with an eigenvalue of 2.109 (11.716 % of variance, $\alpha = 0.755$). From the results obtained, 'High ceilings allow ample natural lighting and cross ventilation' was the most important statement with a factor loading of 0.651. The next statements were 'The tree and shrubs surrounding green homes can act as natural shades to cool down the house', 'Solar energy is a useful form of renewable energy', 'Glass doors and windows allow daylight to enter the house', and 'The North–South orientation reduces direct heat into the house' with factor loadings of 0.649, 0.638, 0.624 and 0.529, respectively. It is reasonable to believe that green homes make best use of the sun, wind and rainfall to help supply the energy and water needs of residents, In addition, green homes with high ceilings allow cross ventilation for a cooling ambience. These green features could significantly reduce electricity consumption as electricity for air handling, lighting and heating was decreased. This suggested that respondents may be willing to own green homes that have design and layout that utilizes prevailing wind conditions and have sufficient openings. The advantage of this feature is that homes need not use air-conditioning, and this would lead to energy savings.

The last motivator was referred to as 'Livability', consisted of 'The green home offers healthy living experience', 'The home is within a short distance of public community amenities', 'The gated and guarded green neighborhood offers superior infrastructure, landscaped greenery and recreational facilities', and 'The home is within a short distance of workplace' with factor loadings of 0.706, 0.653, 0.644 and 0.639, respectively. The eigenvalue for this motivator was 1.552 and the Cronbach's alpha value of this construct was (0.752) considered reasonable. Similar to the finding of Eves and Kippes (2010), distance to public-community amenities and workplace have an effect on households' preference towards homeownership. This result also showed that respondents agree to pay more to live in the gated and guarded green neighborhood because of the safety aspect offered by security guards and day-to-day social activities obtained from recreational facilities, suggesting that households will place preference on green homes in the gated and guarded community when it comes to the matter of living (Table 4).

4.3 The Effect of Motivations on Satisfaction with Green Homes

Tables 5 and 6 showed the odds ratios for each of the motivators of owning green homes. The odds ratios indicate the likelihood of change on satisfaction of owning green homes for each statistically significant motivator.

As mentioned earlier, the first equation showed the effect of motivators of owning green homes on housing satisfaction, whereas the second equation included housing projects and socio-demographic characteristics as control variables. The results of the Cox & Snell R^2

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

Table 4 Factor analysis

	Factor			
	1	2	3	4
Financial incentives (FI)				
The green homes provide cost savings on future electricity bills	.808			
The value of green homes will increase	.797			
The homes incorporating sustainable measure could fetch higher rental	.787			
The green homes provide cost savings on future water bills	.630			
Healthy and sustainable environment (HSE)				
The green homes use renewable energy as its power source		.720		
Many green building products have longevity, thus making maintenance expenses more manageable		.652		
The homes should be built with sustainable construction materials		.646		
Our activities at home have an impact on the increased energy consumption		.621		
Owning a green home is able to demonstrate my responsibility to the community		.621		
Energy efficiency (EE)				
High ceilings allow ample natural lighting and cross ventilation			.651	
The trees and shrubs surrounding green home can act as natural shades to cool down the house			.649	
Solar energy is a useful form of renewable energy			.638	
Glass doors and windows allow daylight to enter the house			.624	
The North–South orientation reduces direct heat into the house			.529	
Livability (L)				
Green homes offer healthy living experience				.706
The home is within a short distance of public community amenities				.653
The gated and guarded green neighborhood offers superior infrastructure, landscaped greenery and recreational facilities				.644
The home is within a short distance of workplace				.639
Eigenvalues	5.079	3.521	2.109	1.552
Eigenvalues % of variance explained	28.217	19.562	11.716	8.621
Cumulative % of variance explained	28.217	47.78	59.496	68.117
Alpha	.875	.817	.755	.752

and the Nagelbkerke R^2 values, which are also described as pseudo R^2 statistics revealed that the explanatory power of the second logistic regression increased by 12 % from 0.408 to 0.457 and 11.85 % from 0.692 to 0.774, respectively as compared to the first equation. Furthermore, the χ^2 values for the Hosmer and Lemeshow Goodness of Fit Test supported both models as being worthwhile.

The results from both equations revealed that an increase in livability of green community was significantly and positively related to the likelihood of housing satisfaction at the 0.05 level, while holding all other variables constant. The results in Table 5 showed that the satisfaction level of green homes is 14.43 times higher for homeowners who value 'livability' as a main motivator than homeowners who do not have this motivation yet.

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

Table 5 Logistic regression equation 1

	B	S.E.	Wald	df	Sig.	Exp (B)
Financial incentives	1.857	0.743	6.237	1	0.013	6.402
Healthy and sustainable environment	2.629	1.187	4.907	1	0.027	13.86
Energy efficiency	2.389	0.873	7.495	1	0.006	10.903
Livability	2.669	0.912	8.569	1	0.003	14.43
Number of observation = 116						
−2 Log Likelihood (42.622); Cox and Snell R^2 (.408); Nagelkerke R^2 (.692)						
Hosmer and Lemeshow Test = χ^2 (2.383), *df* (8), Sig (.967)						

Table 6 Logistic regression equation 2

	B	S.E.	Wald	df	Sig.	Exp (B)
Financial incentives	1.974	1.017	3.769	1	0.052	7.198
Healthy and sustainable environment	3.061	1.498	4.174	1	0.041	21.351
Energy efficiency	2.608	1.091	5.719	1	0.017	13.576
Livability	2.919	1.246	5.485	1	0.019	18.515
Project			1.710	2	0.425	
Project (B)	1.842	1.410	1.706	1	0.192	6.311
Project (C)	0.571	1.239	0.213	1	0.645	1.771
Education			2.470	2	0.291	
Secondary	1.974	1.820	1.176	1	0.278	7.196
Tertiary	2.810	1.796	2.448	1	0.118	16.606
Married	3.219	1.265	6.479	1	0.011	25.008
Number of observation = 116						
−2 Log Likelihood (32.717); Cox & Snell R^2 (.457); Nagelkerke R^2 (.774)						
Hosmer and Lemeshow Test = χ^2 (8.829), *df* (8), Sig (.357)						

After controlling for housing projects and socio-demographic characteristics, there was 18.52 times higher in terms of satisfaction with their green homes. Both results indicated homeowners in the survey place priority on green and sustainable settlements to cope with the demand of quality of living. The construction of green homes should be planned with the intention of providing a healthy living environment. Livability can basically be understood in terms of a healthier and satisfying way of living. Measures of livability can be found in the time taken to commute between home and workplace, or whether the living areas have the proper amenities. Therefore, most homeowners want their homes to be located conveniently in relation to their place of employment, schools, shops, recreational facilities and transportation. For green communities to thrive and stay relevant, it is important to create space for people to walk, mingle, communicate and interact. As pointed out by Vera-Toscano and Ateca-Amestoy (2008) and Tan (2012a), social links with other inhabitants living nearby could contribute higher housing satisfaction among residents.

The next determinant was to analyze whether those who acquired green homes because of energy efficiency were more satisfied with their homes. As shown in the survey, the probability of reporting housing satisfaction was 10.90 times higher for homeowners who agree green homes use key resources like energy more efficiently than for homeowners

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

who did not agree, all other factors being equal. The likelihood of homeowners reporting a higher satisfaction was decreased by 24.5 % to 13.58 times after controlling for differences in housing projects, education attainment and marital status. As explained by Tan (2013), a house that has passive designs end up saving a lot of energy and resource with the minimal use of mechanical systems. For example, high ceilings for promoting cross ventilation, North–South orientation to avoid direct heat, glass doors and windows for daylight to enter the house, and trees for natural shades. As a result, this motivation may contribute to higher housing satisfaction.

A positive and significant relationship was reported in model 1 (sig = 0.027; odds ratio = 13.86 times) and model 2 (sig = 0.041; odds ratio = 21.351 times), respectively on the impact of 'healthy and sustainable environment' on satisfaction with green housing. The estimation for the survey showed that homeowners evaluate their housing satisfaction based on the residential sector's impact on climate change. Environmentally sustainable building generally has low carbon footprints, which is particularly important in an effort to reduce the impact of buildings on carbon emissions (Cradduck and Wharton 2011). As mentioned earlier, green homes focus on reducing the building's impact on human health and the environment during the building's lifecycles through better sitting, design, construction, operation, maintenance and removal (Seelig 2011). In fact, there has been a growing awareness and focus on energy saving measures and recycling in construction methods and practices in the country (Green Building Index 2013).

In terms of the effect of 'financial incentives', there was 12.4 % (odds ratios from 6.40 to 7.20) increase in the likelihood of reported higher satisfaction with green homes when taking control variables into consideration. However, the relationship was only statistically significant at the 10 % level (sig = 0.052). These positive effects may be attributable to potential financial benefits of owning green homes. The financial benefits from green homes take the form of capital and income growth. The capital growth is realized through increased value of the property and the income may be the actual income through rental payments from tenants. Furthermore, green buildings generally consume less energy and these externalities could translate into the saving on water and electricity bills (Eves and Kippes 2010; Ling and Gunawansa 2011), and consequently reporting a high level of satisfaction towards their green homes.

Of socio-demographic characteristics, only marital status was statistically significantly related to the likelihood of housing satisfaction when controlled for all other factors. In the present study, the influence of the increase in educational attainment of the respondent was not an important predictor of housing satisfaction even though many studies confirmed that more highly educated households might be more likely to pay for environmentally sensitive products. Similarly, there were no significant differences associated with housing satisfaction between three different housing development projects in Iskandar Malaysia.

5 Conclusions and Recommendation

In recent years there has been increasing media coverage on issues relating to green homes. A green home focuses on increasing the efficient usage of resource use, while reducing the building's impact on human health and the environment during the building's lifecycle through better sitting, design, construction, operation, maintenance and removal.

Housing developers are urged to build homes that incorporate green and sustainable features because of the impact of the built environment on climate change. However we do not know which green features are preferable by households. Therefore, this research

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

intends to fill the gap by determining the extent to which homeowners are satisfied with different types of green features and uncovering the green features that homeowners are not satisfied with. The aspiration gap approach of housing satisfaction is adopted in this study to understand households' evaluation and their experience of using energy efficiency measures.

Based on the results, respondents are satisfied with features that lead to energy and water efficiency, environmental protection and better indoor environmental quality, such as 13 feet high ceiling, North–South orientation, solar panel system and lush parks with recreational facilities. Rainwater harvesting system, low flow water fixtures and recycled ceramic titles, on the other hand, are not popular features of green homes. This paper also presents and discusses factors which measure benefits that homebuyers receive when they choose to own green homes. According to the survey, there are significant benefits, as defined by Financial Returns, Healthy and Sustainable Environment, Energy Efficiency and Livability that can be received through owning green homes.

Green homes are not just about the physical building being green. It requires a fundamental shift in attitudes and changes in our activities at home. It appears that homebuyers are conscious of what they are buying and they also insist on the house design that is efficient in energy and water consumption.

In order to lead the local property industry towards becoming more environment-friendly, different stakeholders need to contribute a collaborative effort particularly the designers, architects, engineers, government and developers to support the green building rating tools that are developed locally for local conditions. Furthermore, developers should continue to contribute to the green efforts by creating thorough information and education that put genuine green thoughts into the design such as, rainwater harvesting system and low-flow water fixtures to minimize energy and resource usage.

Appendix 1: Survey Items

Satisfaction of Green Home Attributes

Please rate the satisfaction level of your current residence with the following energy efficiency housing attributes on a 5- point scale (1 = strongly dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied, and 5 = strongly satisfied).

1	Modern metal sunscreen louvre facade	1	2	3	4	5
2	Rockwool heat insulation in the roof	1	2	3	4	5
3	Heat extracting wind turbine	1	2	3	4	5
4	Rain water harvesting	1	2	3	4	5
5	North–South orientation	1	2	3	4	5
6	Recycled content ceramic wall and floor tiles	1	2	3	4	5
7	Low-flow water fixtures	1	2	3	4	5
8	Double-glazed panel glass door and window	1	2	3	4	5
9	Solar panel system in the house	1	2	3	4	5
10	10 % of housing area allocated for landscaping	1	2	3	4	5
11	Low VOC paint used in the house	1	2	3	4	5
12	13 feet high ceiling design in the house	1	2	3	4	5

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

13	Cross ventilation in the house	1	2	3	4	5
14	Courtyard space in the house	1	2	3	4	5
15	Recycle bin at the park	1	2	3	4	5
16	Cycling and jogging track in the neighborhood	1	2	3	4	5
17	Water features in the neighborhood	1	2	3	4	5
18	Green park with gym facilities	1	2	3	4	5
19	Road system with boulevard concept	1	2	3	4	5
20	Compound lighting (LED light)	1	2	3	4	5
21	How satisfied are you with green home in general? (the dependent variable)	1	2	3	4	5

Benefits of Owning Green Home

Please rate your level of agreement or disagreement with the following statements on a 5-point scale (1 = strongly disagreed, 2 = disagreed, 3 = neutral, 4 = agreed, and 5 = strongly agreed).

1	The green homes provide cost savings on future electricity bills	1	2	3	4	5
2	The value of green homes will increase	1	2	3	4	5
3	The homes incorporating sustainable measure could fetch higher rental	1	2	3	4	5
4	The green homes provide cost savings on future water bills	1	2	3	4	5
5	The green homes use renewable energy as its power source	1	2	3	4	5
6	Many green building products have longevity, thus making maintenance expenses more manageable	1	2	3	4	5
7	The homes should be built with sustainable construction materials	1	2	3	4	5
8	Our activities at home have an impact on the increased energy consumption	1	2	3	4	5
9	Owning a green home is able to demonstrate my responsibility to the community	1	2	3	4	5
10	High ceilings allow ample natural lighting and cross ventilation	1	2	3	4	5
11	The trees and shrubs surrounding green home can act as natural shades to cool down the house	1	2	3	4	5
12	Solar energy is a useful form of renewable energy	1	2	3	4	5
13	Glass doors and windows allow daylight to enter the house	1	2	3	4	5
14	The North–South orientation reduces direct heat into the house	1	2	3	4	5
15	Green homes offer healthy living experience	1	2	3	4	5
16	The home is within a short distance of public community amenities	1	2	3	4	5
17	The gated and guarded green neighborhood offers superior infrastructure, landscaped greenery and recreational facilities	1	2	3	4	5
18	The home is within a short distance of workplace	1	2	3	4	5
19	Landscaping in the neighborhood enhances greenery	1	2	3	4	5
20	Owning a green home because of the concern for future generation	1	2	3	4	5
21	Owning a green home could improve my status	1	2	3	4	5
22	Government should have initiative in providing incentives through energy-efficiency tax rebates or subsidies	1	2	3	4	5

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

23	The construction industry is regarded as one of the major contributors to climate change	1	2	3	4	5
24	Low-flow water fixtures can function as good as the normal water fixtures	1	2	3	4	5

References

Adriaanse, C. C. M. (2007). Measuring residential satisfaction: A residential environmental satisfaction scale (RESS). *Journal of Housing and the Build Environment, 22*, 287–304.

Amole, D. (2009). Residential satisfaction in student housing. *Journal of Environmental Psychology, 29*, 76–85.

Bond, S. (2010). Lessons from the leaders of green designed commercial building in Australia. *Pacific Rim Property Research Journal, 16*(3), 314–338.

Canter, D., & Rees, K. (1982). A multivariate model of housing satisfaction. *International Review of Applied Psychology, 31*, 185–208.

Choguill, C. L. (2008). Developing sustainable neighborhood. *Habitat International, 32*, 41–48.

Cradduck, L., & Wharton, N. (2011). The adoption of residential sustainability programs: Lessons from the commercial sector. *Pacific Rim Property Research Journal, 17*(3), 388–403.

Eicholtz, P., Kok, N., & Quigley, J. (2008). *Doing Well by Doing Good?* Green Office Buildings: Working Paper, Fisher Centre for Real Estate and Urban Economics, University of California, Berkeley.

Erdogan, N., Akyol, A., Ataman, B., & Dokmeci, V. (2007). Comparison of Urban housing satisfaction in modern and traditional neighborhoods in Edirne, Turkey. *Social Indicators Research, 81*, 127–148.

Eves, C., & Kippes, S. (2010). Public awareness of 'green' and 'energy efficient' residential property: An empirical survey based on data from New Zealand. *Property Management, 28*(3), 193–208.

Feliciano, M., & Prosperi, D. C. (2011). Planning for low carbon cities: Reflection on the case of broward county, Florida, USA. *Cities, 28*, 505–516.

Fisk, W. J. (2000). Health and productivity gains from better indoor environment and their relationship with building energy efficiency. *Annual Review of Energy and Environment, 25*(1), 536–537.

Furst, F., & Mc Allister, P. (2009). An investigation of the effect of eco-labeling on office occupancy rates. *Journal of Sustainable Real Estate, 1*(1), 49–64.

Furst, F., & McAllister, P. (2011). Green noise or green value? Measuring the effects of environmental certification on office values. *Real Estate Economics, 39*, 45–69.

Galster, G. (1987). Identifying the correlates of dwelling satisfaction: an empirical critique. *Environment and Behavior, 19*(5), 539–568.

Gunderson, K. (2006). Simple green. *Journal of Property Management, 71*(5), 42–45.

Green Building Index. (2013). Residential new construction (RNC)—Certified Building. <http://www.greenbuildingindex.org/organisation-certified-buildings-NRNC.html> Accessed 19 Jan 2013.

Harkness, J. M., & Newman, S. J. (2003). Effects of homeownership on children: The role of neighborhood characteristics and family income. *Economic Policy Review, 9*(2), 87–107.

Ling, F. Y. Y., & Gunawansa, A. (2011). Strategies for potential owners in singapore to own environmentally sustainable homes. Engineering. *Construction and Architectural Management, 18*(6), 570–594.

Lovell, H. (2004). Framing sustainable housing as a solution to climate change. *Journal of Environmental Policy and Planning, 6*(1), 35–55.

Lu, M. (1999). Determinants of residential satisfaction: Ordered logit versus regression models. *Growth and Change, 30*, 264–287.

Miller, N., Spivey, J., & Florance, A. (2008). Does green pay off. *Journal of Sustainable Real Estate, 8*(2), 91–103.

Natham, V. (1995). Residents' satisfaction with the sites and service approach in affordable housing. *Housing and Society, 22*(3), 53–78.

Pitts, J. & Jackson, T. O. (2008). Green Buildings: Valuation Issues and Perspectives. *Appraisal Journal*, Spring, 115–118.

Raisebeck, P., & Wardlaw, S. (2009). Considering client-driven sustainability in residential housing. *International Journal of Housing Market and Analysis, 2*(4), 318–333.

Rizzo, A., & Glasson, J. (2012). Iskandar Malaysia. *Cities, 29*(6), 417–427.

Roper, A., Voler, B., & Flap, H. (2009). Social network and getting a home: Do contacts matter? *Social Networks, 31*, 40–51.

Seelig, S. (2011). A master plan for low carbon and resilient housing: The 35 Ha area in Hashtegerd New Town, Iran. *Cities, 28*, 545–556.

Journal : Small 11205 | Dispatch : 19-3-2013 | Pages : 17
Article No. : 310 | LE | TYPESET
MS Code : SOCI-D-13-00038 | CP | DISK

Tan, T. H. (2008). Determinants of homeownership in Malaysia. *Habitat International, 32*, 318–335.

Tan, T. H. (2012a). Housing satisfaction in medium- and high-cost housing: the case of greater Kuala Lumpur. *Habitat International, 36*(1), 108–116.

Tan, T. H. (2012b). Meeting first-time buyers' housing needs and preferences in greater Kuala Lumpur. *Cities, 29*(6), 389–396.

Tan, T. H. (2013). Determinants of Intention to Inhabit Eco-Friendly Homes in Malaysia. *Journal of Green Building*, 8 (3), (In Press).

Toowoomba Regional Council. (2010). Sustainable Home Toowoomba, Sustainable Living. <http://www.toowombarc.qld.gov.au/index.php?option+com_content&view=article&id=240:sustaiable-home-toowoomba&catid+33:sustainableliving&Itemid=55> Accessed 18.12.2011.

Vera-Toscano, E., & Ateca-Amestoy, V. (2008). The relevance of social interactions on housing satisfaction. *Social Indicators Research, 86*, 257–274.

Yu, S. M. & Tu, Y. (2011). Are green buildings worth more because they cost more? IRES Working Paper Series IRES2011-023.