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Residents' Expectation and Perception of Sustainable Housing

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Abstract: Sustainable housing is promoted as housing that is not burdensome where it should follow those criteria regarding resource and energy usage, reduction of carbon dioxide and greenhouse gas emissions, improved indoor air quality, noise reduction and pollution reduction, and environmental compatibility. The demand for sustainable housing development is recognized, but the criteria for implementation are not well defined. This study aims to determine the level of understanding among residents based on sustainable housing features and benefits in Precint 11, Putrajaya. To achieve the objectives of this study, quantitative approach was used and the data were analyzed by using Statistical Package for Social Science (SPSS) version 26. From this study, residents' awareness and understanding of sustainable housing features and benefits of Putrajaya, can be concluded as relatively high.

Keywords: Awareness, Sustainable Housing, Sustainable Development

1. Introduction

The government has initiated intelligent and sustainable housing initiatives for community guidance. There are still shortcomings in the legislation put forward by the government, as the regulations concentrate more on the production of physical housing, design, and construction compared to lifestyles issues connect to intelligent and sustainable housing. The demand for sustainable housing development is recognized, but the criteria for implementation are not well defined. This issue is due to the miscomprehension among residents and the stakeholders [1]. Thus, this study helps to investigate the level of awareness among the residents. If occupant develop an awareness and understanding of sustainable housing and demand is placed on the developer, this can prompt the developer to meet the needs of the customer. Consumer demand growth tends to encourage developers to incorporate sustainable features into sustainable homes [2].

The aim of this research is to identify the essential elements towards creating sustainable housing. In addition, to determine the sustainable housing awareness among residents and the relationship between essential elements with residents' awareness of sustainable housing. This study considers local

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people's opinions and decisions to assess general knowledge regarding sustainable housing benefits, desirable sustainable housing features, and the issue related to a house in Precint 11, Putrajaya. A set of questionnaires will be distributed online to determine the level of awareness of sustainable development. The target of respondents to the questionnaire was locals in Precint 11, Putrajaya. Respondent are the focus community to obtain perspectives and insights into sustainable development problems and evaluate the benefits and degree of sustainable development of the area. Residential areas are considered to be one of the frameworks of the planned development.

2. Benefits of Sustainable Housing.

Sustainable housing refers to the design, construction, installation, maintenance, rehabilitation, and demolition of an environmentally friendly and efficient house throughout its entire cycle [3]. According to Tan [4], sustainable housing is part of sustainable growth, and it can only be called a green home if it meets unique criteria and decreases climate change. The determination of criteria for assessing these parameters is a phase in which there should be a specific initial step. It is claimed that the following four economic factors and the social sustainability of infrastructure ought to be the beginning for the assessment of performance measures [5]:

a) The long-term economic value of the asset should be greater than its financial, environmental and social liabilities secured by the support.

b) The continuing financial, social and environmental costs of sustaining physical infrastructure and services needed to maintain its residential purpose must be manageable for critical stakeholders, such as the state and household sectors.

c) The venue, layout and direct protection of the asset may represent the importance of its demand.

d) Residents may convey a difference between these three things described earlier.

The house is known to emit CO2 and to use a lot of water and energy. As a result, the house has a high shelf life and removes the waste while maintaining the house. At the same time, the environment will be affected by the waste generated during the production and operation of the home [6]. Based on Golubchikov & Badyina [7], several benefits resolve and reduce these problems if sustainable housing is extended:

a) Boost the growth and the dignity of life.

b) Obtain affordable housing.

c) Better health and reduced disease occurrence, death and loss of materials, improved employee performance.

d) More delicate standards of living for social progress, jobs, originality and wealth creation.

e) Longevity and limited maintenance expenses.

f) Protection against the phenomenon of disaster and force majeure.

g) Increase productivity and also save power, water and other material assets.

h) Environmental friendly and sanitary circumstances.

i) Earnings to reshaping and mitigation of climate.

j) Urban growth is more sustainable and socially equitable.

k) Community unity and political amity.

3. Methodology

This chapter describes the methodology used in the case study, including research formwork, the objective, and the study's scope. The data collection method includes preparation and distribution of questionnaires, the results and analysis of the data collected, and, finally, the conclusion of the study.

3.1 The structures of the questionnaire

The development of sustainable housing can also be linked to supply and demand. It is necessary for the occupants to be aware of the benefits of sustainable housing and to understand the features that must be developed. In the previous chapter, the major impediment to sustainable housing development is a lack of public awareness. Furthermore, the questionnaire's second section assessed residents' knowledge of sustainable housing. They were initially questioned on their general understanding of sustainable housing. Residents were asked to rate their knowledge about specific greenhouse benefits such as environmental, economic, and social benefits [8]. The third section will investigate residents' most preferred sustainable housing features from their perspective [8]. In the final section, respondents were asked to assess the challenges and obstacles to building sustainable housing [9].

3.2 Methods of reaching target respondent

There are two methods to collect data online by Google Meet for a pilot survey and any social groups (WhatsApp, email, Facebook) as an actual survey.

3.3 Data analysis

The data collected from the surveys will be used as a Statistical Package for Social Science (SPSS) analysis, a descriptive analysis method that provides the ability to look at the descriptive data collected over a long time. This method of data analysis helps gather feedback on the improvement of data over time and understanding population statistics based on their awareness and opinions on the challenges to sustainable housing development in general.

4. Results and Discussion

This chapter include the data that was collected and analyzed with the Statistical Package for Social Science (SPSS) version 26. Descriptive information is gathered via online distribution channels such as social media (Facebook, WhatsApp group) and email to the community web administrator. The data gathered from the survey were analyzed using analytical tests and correlation test that were carefully examined and the result from the analysis is discussed in detail in this chapter.

4.1 To identify the essential elements towards creating sustainable housing.

Respondents were asked to rate the level of importance for each item in order to determine which sustainable housing features are important to the occupants. Tables 1 show the results of data analysis using SPSS. Waste management, which results in the segregation of bins/ chutes to organize the waste, and a household that is equipped with energy-saving equipment, as well as walls and roof in the house that are equipped with material that reduces solar heat intake, are the most desirable features ranked based on the mean score 4.3577. The second category ranked the highest favorable features, with a mean score of 4.3493, are water efficiency and indoor environment quality. It demonstrates that the vast majority of residents place a premium on indoor air quality. Increased productivity and health will result from high indoor environmental quality. Furthermore, because water is so important in daily life, residents prefer to have more water-saving appliances installed inside their homes and water-efficient fixtures to reduce water consumption. Finally, factors related to the construction stage or profitable contractors and developers influence homeowner opinion. Conflicts over the benefits of owners, developers, and contractors can impede sustainable housing development in some of these cases. Making a balance between owners' profits of construction companies is a criterion for sustainable housing development.

Table 1: Sustainable Housing Features

House Features	Mean	Std. Deviation
C1 Sustainable house has good indoor natural ventilation inside.	4.4113	.66374
C2 Sustainable house is fitted with energy saving appliances and light fittings.	4.3577	.66291
C3 Walls and roof in sustainable house are fitted with materials that reduce solar heat intake.	4.3352	.70733
C4 Plants and greenery planted on the facade and roof of sustainable house.	4.2028	.81545
C5 Extensive landscaping with plants on the premises and grounds around the sustainable house.	4.3465	.66465
C6 Sustainable house is fitted with water saving appliances and water efficient fittings for reduced water usage.	4.3493	.71838
C7 Sustainable house has an irrigation system for landscaping and plants watered using non portable or recycled water.	4.2648	.72702
C8 Sustainable house has provision of separate bins/chutes that enable waste to be sorted (metal, plastics, paper, thrash).	4.3577	.70424
C9 Sustainable house has design that leads to low noise levels, low indoor air pollutants and high indoor air quality.	4.3493	.69438
C10 Sustainable house has public transport accessibility: home is within walking distance of a public transport station.	4.2845	.77069

4.2 To determine the sustainable housing awareness among residents.

Surveys were conducted to determine whether respondents were aware of the benefits of sustainable housing. To investigate further, three major groups are divided on its usefulness based on the environment (B1-1B4), economic benefits (B5-B7), and social benefits (B8-B10). In terms of environmental benefits, most respondent are more aware than other factors that sustainable housing can help improve and protect ecosystems. Table 2 shows that the mean average is 4.40. This demonstrates that Malaysians are well aware of the environmental benefits of sustainable housing. Economic benefits of sustainable housing are the following item to be evaluated. Sustainable housing is associated with a variety of financial benefits for homeowners, such as lower operational costs, increased occupant productivity, and life cycle economic performance optimization, among other things. Economic benefits can help avoid the increase in hidden costs associated with house maintenance and the unjustified increase in house prices. A lower life cycle and operational expenses will inevitably result in more significant savings for the property owner. This can be viewed as a motivation for sustainable housing consumers to spend further in order to benefit from higher savings over the building's life cycle. In particular with respect to the environmental and economic benefits, sustainable housing has several other advantages for its owner. Increased comfort and improved quality of life for occupants is an advantage that is difficult to quantify. Still according to the survey, respondents also have relatively high knowledge of social benefits (average mean 4.33). However, Malaysians' overall general awareness of sustainable housing is still considered average, as complete understanding is 5. As a result, the Ministry must develop and implement new initiatives to promote awareness throughout order to attain sustainable development vastly.

Table 2: Level of Awareness of Sustainable Housing Development

House Features	Mean	Std. Deviation
Environmental Benefits		
B1 I am aware that sustainable housing may help to enhance and protect ecosystems.	4.5465	.62433
B2 I am conscious that sustainable housing may improve air and water quality.	4.5070	.62602
B3 I am aware that sustainable housing can help to reduce material waste.	4.1493	.81492
B4 Sustainable housing benefits the conservation and restoration of natural resources.	4.4169	.66871
Economic Benefits		
B5 Sustainable housing has the potential to save operational costs.	4.2873	.74919
B6 I am convinced that sustainable housing may boost occupant productivity.	4.3577	.67974
B7 Sustainable housing has the ability to improve life-cycle economic performance.	4.3268	.66828
Social Benefits		
B8 Sustainable construction can improve occupant comfort and health.	4.4169	.67710
B9 Sustainable housing has the capacity to boost overall quality of life.	4.3915	.69007
B10 Residents' of sustainable housing can minimize the pressure on the local infrastructure.	4.2648	.71131

4.3 To obtain the relationship between essential elements and residents' awareness of sustainable housing.

The goal of this study was to see if there was a link between residents' understanding of sustainable housing features and their awareness of the benefits of sustainable housing. Correlation analysis was used to achieve this goal. Correlation analysis was used to determine whether a relationship exists between the dependent and independent variables.

The correlation analysis results revealed that all of the independent variables are correlated with the dependent variables. The P value in the correlation analysis result was 0.000, which is less than 0.01 level, for the relationship between the level of awareness and the element of sustainable housing. This finding demonstrated that all of the independent variables are related to the dependent variable, and their understanding of sustainable housing features and benefits is relatively high. The strongest relationship was discovered in Table 3, between residents who are aware that sustainable housing can improve air and water quality and those who live in a house that has good indoor natural ventilation (r =0.428, P = 0.000).

Table 3: Summary of correlations between essential elements and residents' awareness of sustainable housing

Correlations						
		B2	C1	C6	C7	C9
B2 I am conscious that sustainable housing may improve air and water quality.	Pearson Correlation	1	.428**	.371**	.381**	.365**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	355	355	355	355	355
C1 Sustainable house has good indoor natural ventilation inside.	Pearson Correlation	.428**	1	.545**	.429**	.515**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	355	355	355	355	355

Table 3: Continued

C6 Sustainable house is fitted with water saving appliances and water efficient fittings for reduced water usage.	Pearson Correlation	.371**	.545**	1	.493**	.559**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	355	355	355	355	355
C7 Sustainable house has an irrigation system for landscaping and plants watered using non portable or recycled water.	Pearson Correlation	.381**	.429**	.493**	1	.443**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	355	355	355	355	355
C9 Sustainable house has design that leads to low noise levels, low indoor air pollutants and high indoor air quality.	Pearson Correlation	.365**	.515**	.559**	.443**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	355	355	355	355	355
**. Correlation is significant at the 0.01 level (2-tailed).						

5. Conclusion and recommendations

Based on discussion above, several steps can be taken to improve the existing policy. There are three parts of the recommendation which are authority, community and for future study. First is the authority, to educate the awareness of sustainable housing among the citizens, municipalities can broaden the scope of citizens by utilizing government social media, profiles, newspapers, radio, and television broadcast advertisements to inform them of the concept's benefits and the importance of implement sustainable housing at current times while still having the opportunity. The government should then provide a lower-interest fund for sustainable housing developers in order to make sustainable housing less expensive. As a result, developers can lower the selling prices of sustainable housing. Green home builders and architects should use efficient construction approaches and cost-effective methods to maintain market value within a reasonable range for potential homeowner.

For the community, all stakeholders, including architects, contractors, and consultants, can encourage the government to implement sustainable codes for ongoing and prospective constructions, as well as offer incentives to anyone who desires to repurpose their home. To address the issue of a lack of training and education in sustainable housing, governmental or non-governmental organizations can step up efforts by organizing seminars and workshops for designers, engineers, and other construction industry stakeholders to enlighten people on how to achieve sustainability and how essential it is.

The recommendation for future study, housing development may be more environmentally and socially friendly if sustainability is taken into account. Different sustainability factors must be incorporated into housing complexes in order for future generations to be able to satisfy their requirements. From this research, it can be seen that Malaysia is lagging behind in terms of implementing sustainable home construction.

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