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Preface: Proceedings of the 3rd International Conference of Green Civil and Environmental Engineering (GCEE 2021)

The 3rd International Conference on Green Construction and Environmental Engineering (GCEE2021) has been scheduled and successfully taken place in virtual meeting room by Zoom in Malang, Indonesia on 12 August 2021. GCEE 2021 was organised by Department of Civil Engineering, Faculty of Engineering, Universitas Negeri Malang, Indonesia. The theme of this international conference was "Energy-Responsible Building Technology and Life Cycle for Sustainable Built Environment" with topic areas including: sustainable transport challenge, sustainable construction and building materials, sustainable technology in building and infrastructure, forensic process in structures and infrastructure: assessment, repair, and rehabilitation, disaster-resistant structures designs, technologies for safety and health management in construction, supply chain management, green building and materials, sustainable cities and architecture, renewable energy for built environment, waste treatment and management, energy and nutrient recovery from waste and wastewater, sustainable technology for water and wastewater treatment, resilience of water resources management in a global challenge, challenges of integrated water resources management, and gis application in civil engineering.

We would like to acknowledge all of those who supported GCEE2021:

- The entire steering, scientific, and organising committee members of GCEE2021 for their help and support
- Faculty of Engineering, Universitas Negeri Malang
- University partners and institutions
- The distinguished keynote speakers for their acceptance to give speeches and intellectual contribution on their respective fields of expertise.
- The participants and presenters of GCEE 2021 for their contribution and sharing knowledge.

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AIP Conf. Proc. 2447, 010001-1–010001-1; https://doi.org/10.1063/12.0006653
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Location: Malang, Indonesia
ISBN: 978-0-7354-4147-7
Editors: M. Mirza Abdillah Pratama, Cynthia Permata Dewi, Apif Miptahul Hajji, Buntara Sthenly Gan, N. Altınay Perendeci and Ta-Chih Hsiao
Volume number: 2447
Published: Oct 25, 2021

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Cite as: AIP Conference Proceedings **2447**, 030010 (2021); https://doi.org/10.1063/5.0072595
Published Online: 25 October 2021

Maranatha Wijayaningtyas and Kukuh Lukiyanto

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Home Occupants Awareness Toward Green Building: Greenship Rating Index Application

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Abstract. Many real estate developers use the term "green" as a marketing gimmick. The developers assume that providing housing with a green building concept can attract consumers to buy the housing offered, and it turns out that this strategy is successful. As a result, the purpose of this research is to determine residents' awareness of the green building concept and its application in their homes. This research is quantitative research with a survey method. This is done by distributing questionnaires to residents in "green" housing, and there were 325 respondents obtained in this study. The understanding of residents is measured based on the Greenship criteria, a rating tool from the Green Building Council Indonesia for green building certification in Indonesia. According to the findings, residents' awareness of the parameters of green buildings in their homes was focused primarily on appropriate site development, water conservation, and building environmental management. Moreover, as many as 40% agree that the residence has a green concept. Meanwhile, 50% said they disagreed, and the rest were still in doubt. Therefore, it needs support and cooperation between the government, developer associations, and housing developers to understand the importance of green buildings to succeed in sustainable development goals in Indonesia.

INTRODUCTION

Nowadays, the construction industry is one of industry that support main development in Indonesia, and the majority of construction materials come from nature that consumes a great deal of land use, energy and water sources [1]. As a result, the concept of sustainable development must be applied in the construction industry. For that application, the Green Building concept was named. Green has become a short-term concept for sustainable development in the construction industry [2]. Green buildings are environmentally friendly, economically profitable, and provide a healthy environment in which to live and work. As a matter of fact, green building aims to reduce and eliminate negative environmental impacts by improving the quality of unsustainable buildings in design and implementation, construction, and operating practices, ultimately leading to green building, which includes houses, condominiums, and offices [3].

Green residences are a subset of green development and green buildings that focus on environmental pollution control, resource conservation, and energy savings. Many housings and settlements in Indonesia have exceeded their capacity to offer the public the development of environmentally-friendly housing [4]. Green building are a new trend today because the majority of Indonesian consumers have differing perspectives on consuming green or environmentally friendly products. Some people have the same knowledge and want to protect the environment, but some have an impact culture that only buys the best products. [5]. In addition, some consumers are going to buy something for a great deal. However, consumers have realised that the green construction concept of homes is not just a trend in Indonesia but must also change lifestyles [6]. Some follow sustainable development issues and are motivated to switch from traditional to environmentally friendly.

Proceedings of the 3rd International Conference of Green Civil and Environmental Engineering (GCEE 2021)
AIP Conf. Proc. 2447, 030010-1–030010-6; https://doi.org/10.1063/5.0072595
Published by AIP Publishing. 978-0-7354-4147-7/$30.00

Consumers, industry and government are essential elements in developing the housing market with a green building concept [7]. However, it is undeniable that consumers play a crucial role in the successful marketing and development of environmentally friendly homes. As individuals, consumers are influenced by various factors, including how they are aware of the green building concept as their primary needs. This is due to the positive impact of a green building concept on residents and the environment that contributes towards improved sustainable development, for instance improving environmental, economic, and social quality, in the three main pillars [8,9].

Based on this description, it is crucial to know the extent of the resident's awareness of the house in the "green" area towards the green building. The awareness measurement is based on the Greenship Criteria Index from the Green Building Council Indonesia for new housing. This research implies that it can provide input to the government and developers on the level of awareness of residents and the right strategy to implement the Green Building concept in its entirety.

LITERATURE REVIEW

The Green Building Study Based on Occupants' Awareness

Since green building, particularly for Indonesians, is a relatively new term of reference, the concept of green building remains an immediate one. In several Indonesian cities, specific communities, organizations, or associations could raise awareness of sustainability issues by introducing a green building system [10]. Nevertheless, it is not easy to succeed because they are not established simultaneously. Moreover, strict regulations on environmental problems have not been supported. In Indonesia, it is more voluntary and has not become an obligation to implement green construction principles. Encouragement has also decreased, while incentives for building developers committed to green building development are being offered in many countries. For example, Singapore requires all building developers to build green buildings [11]. In order to promote green buildings, the easy issuance of building permits or incentives for fiscal relief is ideally supported. The ease with which development permits are issued will not directly impact the government's planned budget.

Studies on assessing green buildings after occupancy are rarely performed in Indonesia based on occupants' assessments or awareness. There have, however, been studies in other countries on this subject. Gou et al. [12] and Mauree et al. [13] research concluded that green buildings consistently outperform comfort-based non-green buildings. They also investigated that the green building occupants were satisfied with the design and comfort of the building in the room. In contrast, a study showed that the thermal standards were met only by 10% of green buildings elaborated in the study, and only 60% of occupants said they were satisfied with the thermal environment [14]. Indeed, the highest-rated buildings in the occupant survey account for 5-10% of unhappy occupants because of an inconvenient feeling of something or something [15]. No valid proof that green buildings are more comfortable than conventional buildings has emerged, even according to Zalejska-Jonsson [16]. The study reporters indicated that the green buildings' interior environment is warmer than indoor air, creating an uncomfortable environment. However, warmer indoor air in hotter areas like the tropics or arid may not arise because the study was carried out under temperate conditions. That is why the building grading systems have to reflect differences in countries, regions and places if they are to be accepted and used. Other regions, particularly areas with warmer climates, in different climates.

Further studies of the behaviour of users in green buildings show that the connections between green buildings and user behaviour are strong. Green building customers tend to have more positive environmental attitudes than non-green building residents [2]. However, the desire of residents to learn about buildings decreases when they see green buildings on low levels. The study by Jamaludin [17] was published. The study demonstrates that expectations can contribute to shaping resident comfort and behaviour. The human factor should be considered in new concepts of comfort and environmental measurement methods, according to Astuti et al. [18], because it affects building performance and, in particular, sustainable development.

Green Building Criteria Index in Indonesia

If a building passes the evaluation process and is certified green, develop a building can be classified as a green building. The assessment system is used in the assessment of benchmarks. The GBCI (Green Building Council of Indonesia) has currently developed the 'Greenship' rating index. This system should reduce adverse environmental impacts by green residential development stakeholders (customers, industry and governments). Based on these virtues, Housing and Settlement Law No. 1 of 2011 regulates the vision and objectives of the development of housing and

habitation in Indonesia. Thus, the Law stipulates that progress and habitation development must be pursued as a unit performing spatial functions in an environmentally sustainable, physical, live, and socio-economic culture that restores Indonesians' quality of life.

GBCI aimed to address local contexts, such as waste-water use, in preparing the Greenship (technically, the water is still immaculate). The tropical climate in the building's rooms, as well as the impact of the climate on the energy, cooling, and heating requirements of the air conditioning (HVAC), are also considered. Greenship as an assessment tool necessitates government references and support during its development. Thus, using local standards as assessment criteria, the Videlicet Law, Presidential Decrees, Presidential Instructions, Ministerial Regulations, Regional (Provincial) Government Decrees, and Regional (Provincial) Government Decrees, and Indonesian National Standards. Thus, Greenship is comprised of six major criteria: (1) Appropriate Site Development (APS), (2) Energy Efficiency and Conservation (ENG), (3) Water Conservation (WAT), (4) Resources and Material Cycle (MAT), (5) Indoor Health and Comfort (IHNC), and (6) Building Environmental Management (BUE) and its sub-criteria [19].

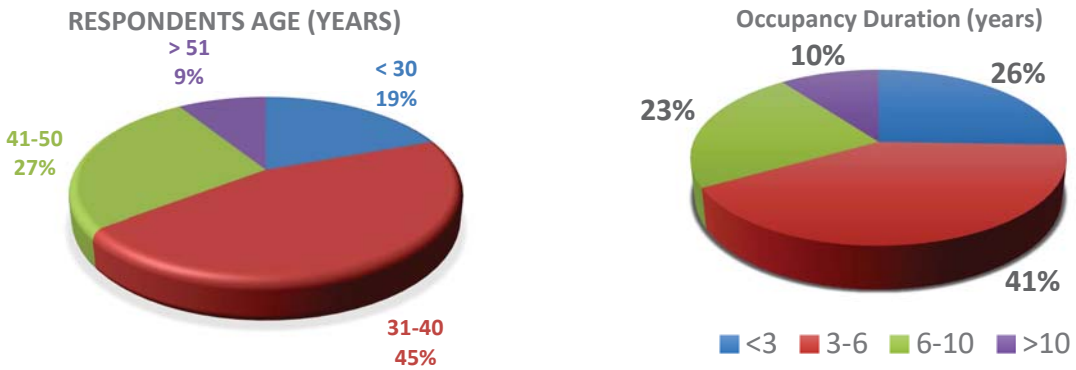
MATERIALS AND METHODS

In this survey, the actual conditions are described using a quantitative survey method with descriptive analysis. Primary data were therefore used by collecting answers directly from the questionnaire. The questionnaires were prepared based on the necessary variables relevant to the research objectives; social media was used to distribute the questionnaires online. Residents of several green residential areas in Malang and Surabaya are inhabitants of this study. The number of participants is calculated by probability sampling (simple sampling), with 350 participants in this study.

Data analyses are fundamental in this study as they provide problems respond depend on the question answers and research goals. This study uses a method of descriptive analysis. The research tool in this research is based on the criteria of the Greenship Rating Index. Data used a Likert scale for measuring. Measurement for all variables indicate that respondents can choose their level of understanding employing a 5 (five) point Likert Scale. For each answer, the following are the categories: strongly agree (5 points score); agree (4 points score); very well agree (3 points Score); disagree (2 points score); strongly disagree (score 1 point).

RESULTS AND DISCUSSION

Based on primary data from the questionnaires distributed, the profile of respondents based on age and length of stay is shown in Figure 1. Most of the respondents are aged between 31-40, in productive age. When the questionnaires were distributed, the average duration of their occupancy in the housing was between 3-6 years. Responses were analysed descriptively by adding up all scores and calculating the average score for each indicator. The results of measuring occupant awareness of the Green Building criteria are shown in Table 1.



(a) (b)

FIGURE 1. Profile of Respondents (Age and Occupancy Duration)

The reliability and validity of the instrument were tested. The tests took place. The distribution of 350 questionnaires and obtaining 325 responses resulted in minimum requirements for the number of respondents. In order to test the instrument reliability and validity, statistical measurements have been carried out, specifically for Pearson's correlation and Cronbach's alpha coefficient, as presented in Table 1. This method ensured that the measuring instrument worked properly. The Cronbach alpha-coefficient value for all items was greater than the acceptable value of 0.6, indicating that the items assigned to measure occupant awareness were reliable.

TABLE 1. Validity, Reliability, and Mean

Variable	Item	Pearson Correlation		Reliability Cronbach Alpha	Mean	Av. Mean
		r	Status			
Appropriate Site Development (APS)	APS1	0.659**	Valid	.896	3.79	4.02
	APS2	0.633**			3.85	
	APS3	0.601**			3.84	
	APS4	0.697**			4.01	
	APS5	0.738**			4.07	
	APS6	0.750**			4.03	
	APS7	0.763**			3.99	
	APS8	0.740**			3.93	
	APS9	0.754**			4.11	
	APS10	0.776**			4.16	
	APS11	0.779**			4.13	
	APS12	0.727**			4.24	
	APS13	0.672**			4.02	
	APS14	0.718**			3.96	
	APS15	0.719**			4.08	
	APS16	0.793**			4.12	
Energy Efficiency and Conservation (ENG)	ENG1	0.610**	Valid	.863	3.74	3.83
	ENG2	0.772**			3.69	
	ENG3	0.658**			3.77	
	ENG4	0.750**			3.77	
	ENG5	0.678**			3.79	
	ENG6	0.734**			3.81	
	ENG7	0.659**			3.57	
	ENG8	0.611**			3.87	
	ENG9	0.677**			3.97	
	ENG10	0.654**			4.03	
	ENG11	0.772**			4.01	
Water Conservation (WAT)	WAT1	0.834**	Valid	.897	4.11	4.00
	WAT2	0.848**			3.92	
	WAT3	0.874**			3.94	
	WAT4	0.838**			4.01	
	WAT5	0.828**			4.04	
Material Resource and Cycle (MAT)	MAT1	0.735**	Valid	.894	3.62	3.79
	MAT2	0.822**			3.71	
	MAT3	0.855**			3.74	
	MAT4	0.846**			3.75	
	MAT5	0.872**			3.83	
	MAT6	0.892**			3.78	
	MAT7	0.741**			3.90	
	MAT8	0.722**			3.75	
	MAT9	0.629**			4.08	

Variable	Item	Pearson Correlation		Reliability Cronbach Alpha	Mean	Av. Mean
		r	Status			
Indoor Health and Comfort (IND)	IND1	0.661**	Valid	.758	4.00	3.90
	IND2	0.722**			3.92	
	IND3	0.707**			3.84	
	IND4	0.806**			3.73	
	IND5	0.761**			3.97	
	IND6	0.737**			3.93	
Building Environmental Management (BUE)	BUE1	0.713**	Valid	.907	3.99	3.99
	BUE2	0.794**			3.83	
	BUE3	0.738**			3.94	
	BUE4	0.878**			4.04	
	BUE5	0.909**			4.00	
	BUE6	0.887**			4.04	
	BUE7	0.872**			4.03	
	BUE8	0.889**			3.99	

According to the data in Table 1, residents' awareness of the application of the green building concept is indicated sequentially by the mean value of the three highest ranks, which are Appropriate Site Development (APS) of 4.02, Water Conservation (WAT) of 4.00, and Building Environmental Management (BUE) of 3.99. The criterion with the highest mean on the APS variable is APS12, related to pest control. This analysis shows the respondent's description of the green building that their residence has been applied and designed to control pests such as mosquitoes, rats, flies and termites. The criterion with the highest mean on the WAT variable is WAT1, related to the use of fittings for water-saving. The majority of residents have implemented the use of water-saving fittings to save water in their residences. As for the BUE variable, the highest average value in BUE4 is the design and sustainable construction sub-criteria with the involvement of at least a competent expert to plan their residential development; This shows that the application of the green residential concept according to respondents is significant for the involvement of experts who understand the concept.

In addition, besides indicators based on the Greenship criteria, respondents were asked to conclude whether their residences had a green concept or not based on their answers at the end of the questionnaire. The results obtained were that as many as 40% stated that their residences had a green concept and must be appropriately managed, 50% said they had not and tried to implement the green residential concept, and as many as 10% were still unsure. This result shows that most respondents are aware of the importance of applying green building in their homes. The findings support the recommendation by Zainordin et al. [20] about the need to consider post-construction residents' awareness of houses that apply the concept of green building.

CONCLUSION

The primary goal of this paper is to investigate the house occupants' awareness of the concept of a green building. This study discovered that the items used to measure all of Greenship's green building concept criteria provided high reliability scores; the mean value indicates that all criteria are required. This finding clarifies that occupants' awareness about green building increases and public awareness of the environment and global warming. Residents are also aware of the notion of green building, according to this study. Therefore, applying the Greenship criteria in the development of environmentally friendly housing areas is simultaneously needed to achieve the goals of sustainable development in Indonesia.

ACKNOWLEDGMENTS

We acknowledge the supports received from several housing developers in Malang and Surabaya, particularly for home occupants in those areas.

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