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Preference and Willingness to Pay of the Millennial Generation in Indonesia for Low Energy Housing

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Abstract

Nowadays, Indonesia is one of the countries with the most significant rate of energy consumption in the world. In response to this, the government began to promote energy-saving movement through a housing program. However, this program has not achieved its maximum results due to the lack of an active role in the community. Therefore, the preference of generation Y or known as the millennial generation is significant because of its high population. They can contribute to the trend of future housing. This study was conducted to determine the level of interest and Willingness to Pay (WTP) of the millennial generation for low energy housing. The survey has used online questionnaires given to 121 respondents from varying levels of income. Low energy housing factor which is assessed by the millennial generation consists of location, accessibility, local materials, active technology, and cost-effectiveness. Regression and analysis of variance results show that WTP is not influenced by factors considered important by the respondents, but significantly by the income level. The higher the income, the higher the WTP. The level of WTP respondents with an income below and equal to Regional Minimum Wage (RMW) increases when the income level is above RMW. Respondents with an income level below RMW are interested in landed housing, while respondents with an income above RMW are interested in the vertical house. In conclusion, the millennial generation in Indonesia shows a strong interest and expectation for the development of low-energy housing.

Keywords: low energy housing, millennial generations, preference, willingness to pay

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1. Introduction

Currently, the phenomenon of energy becomes essential in the history of world civilization. Whether we realize it or not, energy becomes a primary human need in the task of

every aspect of life. Indonesia's energy flow data in the period of 1985-2000 reached 7% per year and continued to increase, even reaching 10% in 2007 [1]. The value is compared with the average world flow of 1.2% per year, making Indonesia classified as one of the countries using the world's waste energy [2]. One of the most significant contributors to energy consumption in Indonesia is the housing sector. International Energy Agency [3] announce energy use by the household sector in Indonesia by 2015 had reached 38%.

Since 2000, household energy demand in Indonesia has increased by 35% due to population growth, number and floor area of households, and level of ownership of electronic devices. In regards to the fact, the Ministry of Energy and Mineral Resources began to intensify the energy-saving potential of households through several programs such as 'Potong 10%' [4] which is realizing fair energy and in line with the global energy management paradigm and the stipulation of Government Regulation No. 07/2015 about the application of minimum energy performance standards. However, the program has not achieved yet its maximum, because of the lack of active participation of the community.

One of the triggers for the increase in energy consumption in Indonesia is population growth. Indonesia will experience a demographic bonus phenomenon, that is predicted as Generation Y or millennial generation which will dominate the population [5]. This generation is a population whose birth is between 1977 and 1994. It is a population which is strongly associated with lifestyle [6]. This age group includes the two phases of life out of the twelve phases that are the early-adulthood and midlife [7] and hence, they have a preference for the desired housing.

Research on low energy housing in Indonesia has been done by Jurizat et al. [8] and Wiranata [9]. Both used perceptual analysis as a method of analysis to find out the public perceptions of the application of energy-efficient housing. Jurizat et al. [8] pointed out that the results of people's perceptions of energy use in the residential house were by profession. The results of perceptual analysis obtained two categories of energy efficiency which was a response to natural energy and efficient use of secondary energy. Wiranata [9] revealed several factors affecting the concept of energy-efficient housing such as site location, maintenance, waste treatment, landscape, occupant awareness, environmentally friendly, alternative energy, cost-effective, government regulation, energy saving, and home design. Both studies were not specific to the subject of a particular generation category.

This study has used variables from previous research that has been analyzed through different methods of preference and willingness to pay. The novelty of this study is the

subject of the millennial generation which age in 2018 ranges between 24 and 41 years with varying levels of income. The research was conducted to find out the interest level of the millennial generation and willingness to pay to low energy housing in Indonesia. The output of this research is expected to be an input related to future projections in the provision of low energy housing in Indonesia.

2. Research Methods

The research is descriptive-correlational and has used the quantitative method [10] to reveal the relation between the level of income of the millennial generation and, the level of interest and willingness to pay the low energy housing in Indonesia. Data collection has used questionnaires that contained a question frame that was compiled based on the findings of the previous research. The preliminary results of the study were obtained from the research of Jurizat et al. [8] and Wiranata [9] that were related to factors influencing people's perceptions of energy-efficient homes in Indonesia.

2.1. Method of collecting data

Data collection was done non-experimentally through the spread of an online questionnaire. Questionnaires were addressed to the millennial generation whose age ranged between 24 and 41 years and who had an income. The process of selecting respondents has been done by using the purposive sampling technique, which meant that the selection of the respondents was based on specific parameters chosen by the researcher [11]. The questionnaires used closed-ended questions. Questions were divided into three groups, namely respondents' self-data, respondents' preference for low energy housing in Indonesia, and willingness to pay (WTP) which was related to individual facilities, such as residential rent, electricity, water, maintenance of building and infrastructure.

2.2. Data analysis method

Data analysis was conducted quantitatively with one-cross sectional [12] research type in the current period (retrospective). Data analysis was performed using Analysis of Variance (ANOVA), multivariate cluster correspondence and regression analysis. ANOVA was done to determine the differences between the millennial generation WTP level based on their income. Multivariate cluster correspondence analysis was conducted to find out the correlation between the millennial generation revenue level and the

housing type preference related to the area and the type of low energy housing. The use of regression analysis was to determine the relationship between the factors that affected the preferences with the level of WTP by the millennial generation. The study was conducted through three different analysis to obtain diverse data in uncovering preferences and WTP of the millennial generation for low energy housing in Indonesia.

3. Results and Discussion

The questionnaires were distributed between 12 and 15 May 2017 with a total of 121 respondents. Three characteristics were observed: marital status, occupation, and income level. The gender of respondents consisted of 55 men and 66 women. The age of the respondents of the millennial generation varies with a range of 24 to 41 years. Respondents with single status were more dominant 88,7%, while the married were 33,3%. The employment of the respondents consisted of entrepreneurs, students, civil servants, and private employees. The most dominant occupation of respondents was private employees who were 50.41%. The data of income level of the respondents are grouped into three categories, those who belonged to the income level below Regional Minimum Wage (RMW), the income level which equaled to RMW, and the income level above RMW. Respondents with income below RMW (<Rp1.000.000,00 & Rp1.000.000,00-Rp3.000.000,00) were 50%. Respondents with income equaled to RMW (Rp3,000,000,00-Rp5,000,000.00) were 24%. Respondents with an income above RMW (Rp5.000.000,00-Rp10.000.000,00 &> Rp10.000.000,00) were 26%.

The predominant respondents lived in 2-3 storied buildings which were 63%. The status of private ownership was 51% of respondents lived with parents, the rest were ownership, and rent. It indicates that respondents have the possibility of going forward to have their dwelling. As many as 60% of the housing did not apply low-energy which indicated that awareness of energy saving is low but had a great chance to apply the low-energy system.

The preference of millennial generation in low energy housing, respondents were given the opportunity to assess the factors that were considered important in choosing low energy housing. These factors were a combination of Jurizat et al [8] and Wiranata [9] research findings consisting of “location near the city center”, “easy access to transportation”, “application of local materials”, “active technology in buildings”, “active technology in the region”, “natural lighting and natural ventilation”, “cost-effective electricity and water”. Respondents were asked to rate using a Likert scale of 5 scales ranging from strongly disagree to strongly agree.

Preferences in the form of factors affecting the interest of the millennial generation in low energy housing were analyzed using regression with JMP. Regression analysis was done with an independent variable in the form of factor preference, which was considered important by the respondent, and the dependent variable is the WTP. Regression results showed a weak significant value (0.0862). Table 1 shows that the factors that have the most significant influence on the WTP are cost-effective for electricity and water. The least significant factor is the application of local materials.

Respondents tended to be interested in the concept of low energy housing because it saved the monthly cost of electricity and water. It is supported by Handayani [13] who stated that energy is an essential parameter for economic growth. The millennial generation who were still in their early adulthood to middle adulthood saw low energy housing as an economic investment through a dwelling. So, they chose to spend more money to invest in low energy housing if it could save electricity and water costs. It can be seen from Table 1 which shows that cost-effective electricity and water have the most significant influence on the WTP level (0.34).

Application of local materials is a factor that has little effect on the level of WTP. The millennial generation tends to think that the application of local materials to housing does not interest them in low energy housing. It is influenced by the difficulty of maintaining the use of local materials, and the millennial generation's characteristic is strongly influenced by lifestyle. The influence of lifestyle then makes the preferences of the millennial generation tend to lead to a precedent of building abroad or more modern so that the local material becomes no more interesting. On the other hand, the application of local materials also has the disadvantage of high maintenance costs and the difficulty to obtain [14]. Looking at the tendency of the millennial generations who see housing as an economic investment is the reason for the small effect of local materials on the willingness to pay (0.04).

Preferred occupancy preferences according to Rapoport [15] is divided into four: consumption oriented that relates to the convenience of living and choosing residence in the city center due to the complete facilities; social prestige oriented that is more related to the community generally chooses suburban areas; family oriented prioritize the interests of children and chose residence with broad pages and availability of facilities for families; and community oriented are settlements with certain ethnic types or specific occupations. In this study, it was found that the millennials tended to have social prestige oriented preferences. In Table 1 the millennial generation tended to be uninterested (-0.08) in low energy housing when located in the city center. It suggests

the millennial generation prefer to live in the suburbs with easy access to transportation (0.08).

Table 1: Regression of Preference and Willingness to pay.

Term	Estimate	Std Error	t Ratio	Prob>|t|
Location near the city center	-0.08	0.14	-0.60	0.55
Easy access to transportation	0.08	0.14	0.54	0.59
Application of local materials	0.04	0.14	0.27	0.79
Active technology in buildings	0.15	0.16	0.95	0.34
Active technology in the region	0.31	0.14	2.13	0.04
Natural lighting and natural ventilation	0.13	0.17	0.79	0.43
Cost-effective electricity and water	0.34	0.17	1.93	0.06

The next stage is analyzed using ANOVA by using an independent variable of WTP and variable tied to income level. ANOVA is used to know the difference of parameters (numerical indicator always used continuous data) between nominal data by looking at the average parameters of each category in nominal data. In this study, ANOVA used to see the difference of parameters between groups from the nominal category of income level. ANOVA analysis results (Figure 1) shows a significant value of <.00001.

The x-axis (Figure 1) shows the nominal millennial generation category data with an income level above RMW, equal to RMW, and below RMW. Y-axis is the level of WTP to low energy housing. The mean diamond diameter indicates the average preference evaluation based on the income level. The results of ANOVA show a tendency that the higher the level of income the higher the level of WTP millennial generation. Based on the mean value seen in the willingness to pay at the level of income below the RMW (<Rp1,000,000,00 & Rp1,000,000,00-Rp3,000,000.00) and the equal RMW (Rp3,000,000.00-Rp5,000,000.00) same. Willingness to pay increased significantly at the level of income above the RMW, i.e., at Rp3,000,000.00-Rp5.000.000,00 and would increase at the income level > Rp10.000.000,00

The results of the preference and WTP analysis based on the income level show similar results: the higher the income level, the more respondents show interest in low energy housing and the higher the WTP is. Willingness to pay is divided in the cost of the rental fee of housing, electricity, and water, maintenance of building and maintenance of infrastructure. For rental fee housing, the average respondent is willing to spend more than 30% of their monthly income.

Respondents (Figure 2) were willing to spend the most on electricity and water costs, while the smallest was the cost of maintaining the infrastructure. Further, it reinforced the

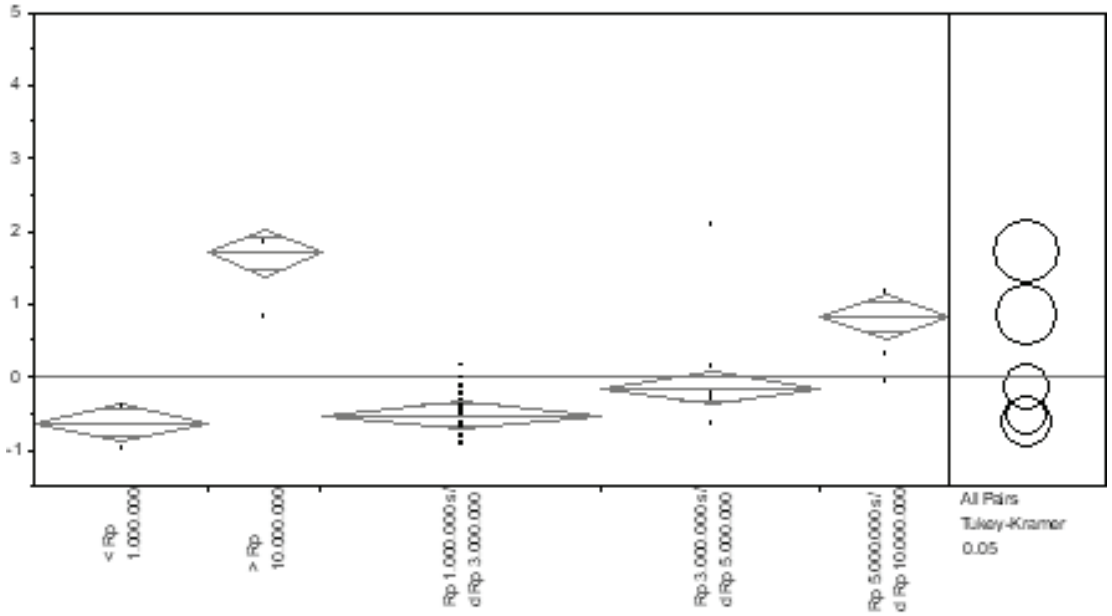

Figure 1: Results ANOVA Revenue Rate and Willingness to Pay.

sign that the millennial generation tended to see housing as an economic investment, so they were willing to spend more on the building than on infrastructure.

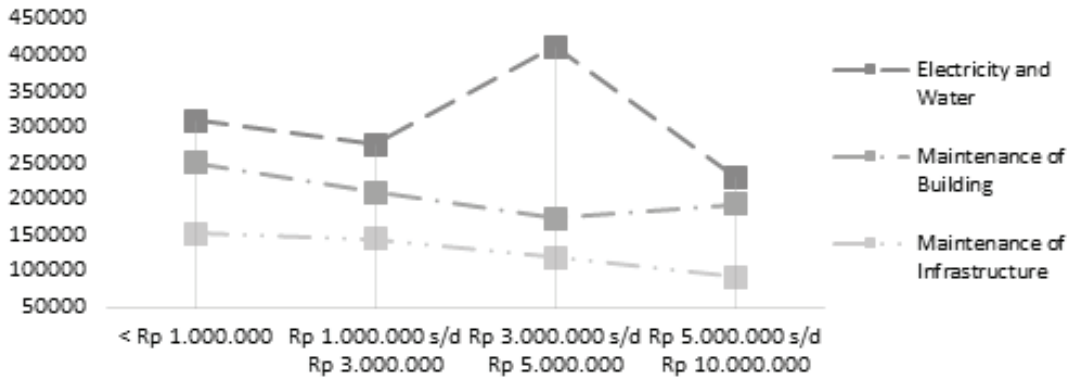

Figure 2: Relationship Revenue Rate and Willingness to Pay.

The next step was to find out the preference of low energy housing type desired by the millennial generation conducted by multivariate cluster correspondence analysis. This analysis aims to find out what type of housing correlates with the millennial generation based on income level. Figure 3 shows the results of a study performed using ward hierarchical clustering. The result of the analysis shows that respondents with income below RMW (<Rp1.000.000,00 & Rp1.000.000,00-Rp3.000.000s,00) have an interest in landed building, whereas respondent with an income equal to RMW (Rp3,000,000.00-Rp5. 000.000,00) and above RMW (Rp5.000.000,00-Rp10.000.000,00

&> Rp10.000.000,00) tended to be interested in vertical building that has 2-3 floors and> 4 floors.

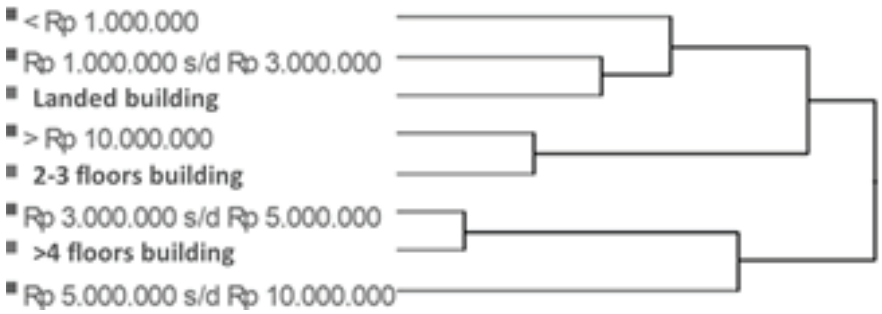

Figure 3: Correspondence analysis between income level and occupancy type preference.

Based on the result of Regression Analysis, ANOVA, and Multivariate Cluster Correspondence, it is observed that the higher the income level, the preferences value, and the WTP level are higher. In this study, the preference value is divided into two aspects: the preference of the factors that influence the level of interest of the respondent and the type of low energy housing. Meanwhile, the WTP is divided into four things: the rental fee of housing, the cost of electricity and water, the maintenance of building infrastructure and the maintenance of infrastructure.

The millennial generation with income levels below RMW (<Rp1,000,000.00 & Rp1.000.000,00-Rp3.000.000,00) felt attracted to low energy housing when there was easy access to transportation, cost-effective electricity, and water, with non-storied building types. They were willing to pay the rental fee between 25-35% of their income. Respondents with the level of income equal to RMW (Rp3,000,000.00-Rp5.000.000,00) were interested in low energy housing if cost-effective electricity and water and apply active technology in buildings. They are willing to pay the rental fee> 25% of their income. Respondents with an income level above RMW (Rp5.000.000,00-Rp10.000.000,00 &> Rp10.000.000,00) were attracted to the low-energy housing when applying natural lighting and cooling and were in locations with easy access to transportation. They were willing to pay the rental fee > 35% of their income.

This study shows that income and age have a personal effect on the preference for low energy housing in Indonesia. This is similar to the findings of Nair et al. [16] who stated that individual factors influencing energy efficiency include age, education, and income. In terms of income, Bartiaux et al. [17] and Herring et al. [18] showed that income influences investment behavior according to energy efficiency. Meanwhile, Barr et al. [19] indicated a low correlation between income and investment behavior according to energy efficiency. The existence of different variations of findings indicated that income has a different effect on the preference for low energy housing. This may be due to

factors outside the income context such as age, educational background, location, and cultural background. Therefore, further research is needed to confirm this.

In general, when asked about the expectation of low energy housing implementation in Indonesia, respondents showed a positive response. Respondents mentioned that low energy housing needs to be more socialized because user awareness was a crucial factor. From the government side, the respondents also mentioned the need for clear and transparent regulations and programs, so that low energy housing can be reached not only by the upper-middle-class society but also by the lower-class society.

4. Conclusions

The role of the millennial generation is important because this generation is at a productive age and thus, plays an active role in the government, community, and other social environments. The millennial generation who shows great and positive hope for low energy housing in Indonesia can be an input for the government related to housing planning in Indonesia to be well targeted for an upper-middle-lower-class society without any specific disparities. Housing for the millennial generation tends to be seen as an economic investment so that the value of preferences and the willingness to pay level to prioritize the factors directly related to the building compared to the region. The millennial generation whose characteristic is affected by lifestyle is seen in the preference of residential selection leading to social prestige oriented.

Factors related to buildings and infrastructure found no significant effect on the willingness to pay. On the other hand, the level of income becomes a significant factor affecting preference and willingness to pay. The higher the income level, the more respondents show interest in low energy housing and the higher the willingness is to pay. The higher the income level, the preferred type of building is more directed to the vertical building than the landed building. The highest level of willingness to pay is the cost of building, while the lowest is the cost of infrastructure.

Research on low energy housing analyzed through preferences and willingness to pay provides a different outcome than the previous research analyzed through perception. The advantages of preferences analysis and willingness to pay are the output obtained directly directed to the level of income. This is because, from the beginning of the study, respondents have been focused on the assessment based on their perception of the current economic conditions. In contrast to the perceptual analysis that allows the perception of wishful thinking because it is not focused on economic conditions but

the perception of its users. Both of these analyses can be applied to research on low energy housing to produce various outputs and complement each other's findings.

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