

Evaluation of Green Building in the Existing Building of the Department of the Environment of DKI Jakarta Province in the Order of Reducing Greenhouse Gas Emissions

Gamma Nanda Bhaskoro^{1,*}, Nadiroh², Sucahyanto³

¹Department of Environmental Management, Universitas Negeri Jakarta, Indonesia

²Department of Pancasila and Civic Education, Universitas Negeri Jakarta, Indonesia

³Department of Geography Education, Universitas Negeri Jakarta, Indonesia

Abstract:- One of the aims of sustainable development is to reduce the emergence of the issue of the greenhouse effect, global warming, and climate change, including the issue of the natural resource crisis and the energy crisis. Jakarta is the center of government, the center of the Indonesian economy, so that many governments and private office buildings have been built, which have not all implemented the green building concept. Because the concept of Green Building is still considered a newly accepted concept in Indonesia and not many people know about it. As a form of implementing the green building concept in Jakarta, the DKI Jakarta Provincial Environment Agency as the agency in charge of the world's environment has committed to adapting the eco office concept to office buildings. It is hoped that the concept of green building can also be applied to the DKI Jakarta Provincial Environment Agency building. So, it is necessary to know the potential, problems, conditions, conformity with green building assessment standards according to current conditions and later submit several recommendations for increasing conformity with green building criteria standards if needed.

Keywords:- Green Building; Existing Building; Sustainable Development.

I. INTRODUCTION

Green Building is currently a very important issue given the rapid development in Indonesia and the need for energy that continues to increase [1]. Green building is also one of the components in supporting low-carbon development, namely through policies and programs to increase energy efficiency, water, and building materials and increase the use of low-carbon technology [2,3]. The application of Green Building not only provides ecological benefits but also has economic value because it can reduce building operational and maintenance costs [4,5].

Along with the development of Green Building in Indonesia, the Minister of Environment has issued Regulation of the State Minister of the Environment No. 08 of 2010 concerning Criteria and Certification of

Environmentally Friendly Buildings [6]. This regulation reinforces the previous regulations that have been issued by the government in PP No. 36 of 2005 concerning Implementing [7], Regulations of Law no. 28 of 2002 concerning Buildings [8]. The Governor of DKI Jakarta Province has also issued Governor Regulation Number 38 of 2012 concerning Green Buildings, which aims to guide the application of the green building concept to buildings in DKI Jakarta [9].

II. METHODOLOGY

This research was conducted at the DKI Jakarta Provincial Environmental Office Building, which is located at Jalan Mandala V No. 67, Cililitan, Kramat Jati, East Jakarta, DKI Jakarta Province.

Data retrieval using several methods as follows:

1. Survey method (field survey), ie data collection is done through observation, questionnaires (questionnaire), and personnel interviews.
2. Library research method, namely data collection carried out by the literature study method.
3. Documentation and field observation methods, namely data collection by documenting sources in the field related to real problems and conditions as well as measurements for criteria in the Green Building Category that need to be carried out.

III. RESULT AND DISCUSSION

A. Analysis of Greenship Rating Tools Existing Building Version 1.1.

Conformity analysis is obtained by comparing the results of the checklist with existing tools, namely the Greenship Rating Tool Existing Building Version 1.1. After adjustments are made, points are obtained for each criterion and then the results are added up to become a total point and a ranking category will be obtained in GREENSHIP. The following are 6 (six) categories of Greenship Rating Tool Existing Building Version 1.1 which will be reviewed for each criterion and benchmark.

1. Land Use Appropriate Category (ASD)

2. Energy Efficiency and Conservation (EEC) Category
3. Category of Water Conservation (WAC)
4. Source Category and Material Cycle (MRC)
5. Indoor Health and Comfort (IHC) Category
6. Category of Building Environment (BEM)

Assessment or scoring of each criterion according to the benchmark, the final value will be obtained which will be known as the Green Building predicate that will be obtained. Table 1 shows the scoring of the assessment results.

TABLE I. THE SCORING OF THE ASSESSMENT RESULTS

CODE	RATING	MAX POIN
APPROPRIATE SITE DEVELOPMENT		
ASD P1	Site Management Policy	0
ASD P2	Motor Vehicle Reduction Policy	0
ASD 1	Community Accessibility	1
ASD 2	Motor Vehicle Reduction	0
ASD 3	Site Landscaping	1
ASD 4	Heat Island Effect	0
ASD 5	Storm Water Management	0
ASD 6	Site Management	1
ASD 7	Building Neighbourhood	2
Total		5
ENERGY EFFICIENCY & CONSERVATION		
EEC P1	Policy and Energy Management Plan	0
EEC P2	Minimum Building Energy Performance	0
EEC 1	Optimized Efficiency Building Energy Performance	16
EEC 2	Testing, Re-commissioning or Retro-commissioning	0
EEC 3	System Energy Performance	0
EEC 4	Energy Monitoring and Control	0
EEC 5	Operation and Maintenance	0
EEC 6	On Site Renewable Energy	
EEC 7	Less Energy Emission	0
Total		16
WATER CONSERVATION		
WAC P	Water Management Policy	0
WAC 1	Water Sub-Metering	0
WAC 2	Water Monitoring Control	0
WAC 3	Fresh Water Efficiency	0
WAC 4	Water Quality	0
WAC 5	Recycled Water	0
WAC 6	Potable Water	0
WAC 7	Deep Well Reduction	0
WAC 8	Water Tap Efficiency	0
Total		0
MATERIAL RESOURCE AND CYCLE		
MRC P1	Fundamental Refrigerant	0
MRC P2	Material Purchasing Policy	0
MRC P3	Waste Management Policy	0
MRC 1	Non ODS Usage	2
MRC 2	Material Purchasing Practice	0

CODE	RATING	MAX POIN
MRC 3	Waste Management Practice	3
MRC 4	Hazardous Waste Management	2
MRC 5	Management of Used Good	0
Total		7
INDOOR HEALTH AND COMFORT		
IHC P	No Smoking Campaign	0
IHC 1	Outdoor Air Introduction	2
IHC 2	Environmental Tobacco Smoke Control	2
IHC 3	CO2 and CO Monitoring	0
IHC 4	Physical, Chemical and Biological Pollutants	1
IHC 5	Thermal Comfort	0
IHC 6	Visual Comfort	0
IHC 7	Acoustic Level	0
IHC 8	Building User Survey	0
Total		5
BUILDING ENVIRONMENT MANAGEMENT		
BEM P	Operation and Maintenance Policy	0
BEM 1	Innovations	5
BEM 2	Design Intent and Owner's Project Requirement	0
BEM 3	Green Operational and Maintenance Team	1
BEM 4	Green Occupancy/Lease	0
BEM 5	Operation and Maintenance Training	0
Total		6

B. Questionnaire Analysis

Questionnaires were distributed to respondents by filling in online using Google Form, and 110 respondents answered. From this data processing will be obtained an overview of the background of the respondents and the tendency of answers for each variable.

C. Respondent Profile

Respondent profiles were grouped by age, gender, last education, and years of service. Figure 1 shows the results of the recapitulation and discussion of the respondent's profile.

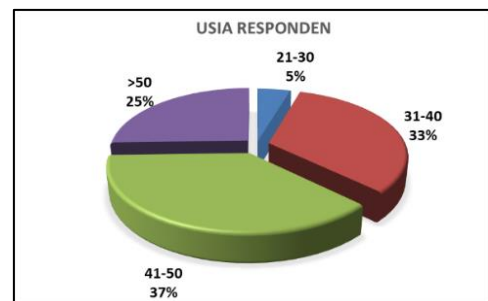


Fig. 1. Respondent Age Data Graph

Based on the graph above, it can be seen that the majority of respondents are dominated by respondents in the 41-50 year age group of 41 people (37%), followed by 36 people (33%), followed by the 31-40 year age group (33%), over 50 years old. 28 people (25%) and in the last order is the group of respondents aged 21-30 years as many as 5 people (5%).

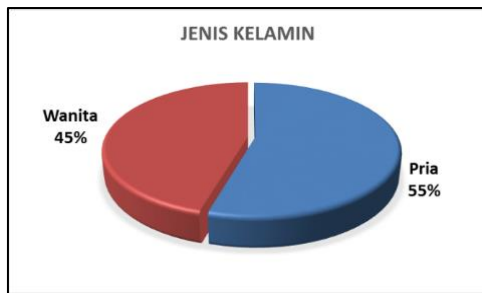


Fig. 2. Respondent Gender Data Graph

If seen from Figure 2 regarding gender, the respondents in this study were dominated by 60 male respondents (55%), and 50 female respondents (45%).

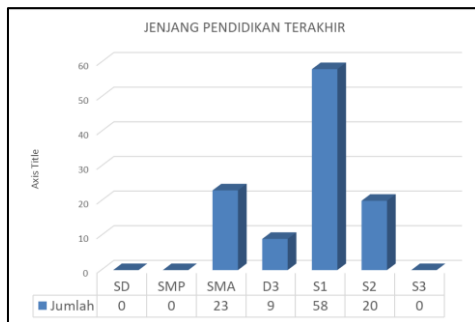


Fig. 3. Last Education Level Chart

Based on figure 3 of the latest education level above, it can be seen that the majority of the respondents' latest education levels were Bachelor's degree as many as 58 people (53%), followed by high school level as many as 23 people (21%), Master level as many as 20 people (18%) and education level D3 as many as 9 people (8%). There are no respondents with the last education level of SD, SMP, or S3.

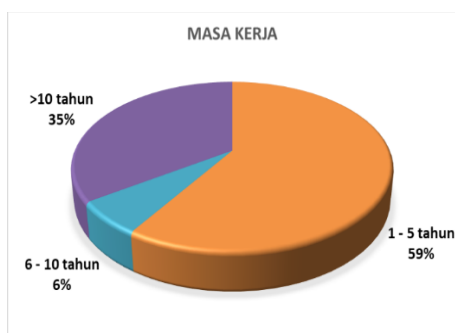


Fig. 4. Respondents Working Period Chart

Figure 4 shows Respondents' Working Period Chart. The period of service of the respondent in question is the period of service of the respondent having an office in the DKI Jakarta Provincial Environment Agency building. Based on the graph above, it is known that most respondents have a working period of 1-5 years, namely 65 people (59%), respondents with a working period of more than 10 years as many as 38 people (35%), and respondents with a working period of 6-10 years, as many as 7 people (6%).

D. Questionnaire Test Results and Analysis

Data collection was obtained through a questionnaire that was formulated based on the category of Greenship Rating Tool Existing Building Version 1.1 and filled in by the respondent which was then processed into information. The respondents involved in data collection were 110 people, namely employees of the Environmental Service Office. By using a Likert scale with a score of 5 = strongly agree, score 4 = agree, score 3 = quite agree, score 2 = disagree, score 1 = strongly disagree.

1) Validity test

Before carrying out research using an instrument in the form of a questionnaire, a pilot test was carried out on some respondents to test its validity. If the instrument is considered valid, the researcher will use the questionnaire for his research. In terms of testing the validity of the instrument, a trial was carried out on 30 respondents, where the respondents were employees of the Environmental Service having an office in the Main Building of the DKI Jakarta Provincial Environmental Service. Tabulation of data based on the results of this questionnaire trial can be seen in the appendix. In testing the validity of the instrument, the researcher used the help of the SPSS version 21 program.

That a question/question is declared valid if the results of the Pearson correlation $> r_{table}$ (sig. 0.05). To determine the value of r_{table} (sig. 0.05) can be seen in table r with the number of data $N-2 = 28$ in the appendix. Judging from the r_{tables} , it is known that the r_{table} data is 0.3061. From the results of the comparison of scores on the question/question which consists of 48 questions, and all questions/questions are declared valid.

2) Reliability Test

A reliability test is used to determine the extent to which the questionnaire can be trusted. In SPSS statistics, the reliability test is used to determine the level of consistency of the questionnaire by the researcher so that the questionnaire can be trusted. In this study, the reliability test used Cronbach's alpha with the help of the SPSS version 21 program. The calculation results of the questionnaire reliability test were as follows table 2.

TABLE II. THE RESULTS OF THE QUESTIONNAIRE RELIABILITY TEST USING ALPHA CRONBACH

Cronbach's Alpha	N of Items
0.962	48

From the output table above, it is known that the alpha value is 0.962 and then this value is compared with the alpha coefficient value.

Sarwono said if the correlation value > 0.8 then the instrument is reliable and vice versa, if the correlation value < 0.8 then the instrument is less reliable.

3) Test Results Using a Likert Scale

From the results of the analysis of the number of answers per item using a Likert scale, using a Likert scale scoring.

The questionnaire discusses the understanding and behavior of respondents who are users of the Environmental Service Office because what determines the success of the green building is not only the concept of the building but also the understanding and behavior of users who can apply it. This questionnaire uses an approach using the category of Greenship Rating Tool Existing Building Version 1.1 which will be reviewed for each criterion and benchmark.

a) Test results for Land Use Appropriate Category (ASD)

The total observation score from Land Use Appropriate data at the Environmental Service is 2698 (61.32%) of the expected score of 4400 (100%). Based on the criteria in the understanding table according to Arikunto (2009: 4), the percentage of the total score is included in the Understanding category.

b) Test results for Energy Efficiency and Conservation (EEC) Category

The total observation score from the Energy Efficiency and Conservation data is 3329 (75.66%) from the expected score of 4400 (100%). Based on the criteria in the understanding table according to Arikunto (2009: 4), the percentage of the total score is included in the Understanding category.

c) Test results for Water Conservation Category (WAC)

The total observation score from Water Conservation data is 3258 (74.05%) of the expected score of 4400 (100%). Based on the criteria in the understanding table according to Arikunto (2009: 4), the percentage of the total score is included in the Understanding category.

d) Test results for Source Category and Material Cycle (MRC)

The total observation score from Source & Material Cycle data is 3511 (79.80 %) from the expected score of 4400 (100%). Based on the criteria in the understanding table according to Arikunto (2009: 4), the percentage of the total score is included in the Understanding category.

e) Test results for Indoor Health and Comfort (IHC) Category

The total observation score from the Air Quality & Indoor Comfort data is 3002 (68.23%) from the expected score of 4400 (100%). Based on the criteria in the understanding table according to Arikunto (2009: 4), the percentage of the total score is included in the Understanding category.

f) Test Results for Building Environment Category (BEM)

The total observation score from the Building Environmental Management data is 2945 (66.93%) from the expected score of 4400 (100%). Based on the criteria in the understanding table according to Arikunto (2009: 4), the percentage of the total score is included in the Understanding category.

IV. CONCLUSION

In the evaluation of the Green Building at the DKI Jakarta Provincial Environmental Service Office, it can be concluded as follows:

1. The DKI Jakarta Provincial Environmental Service Office has not yet implemented the fulfillment of the Greenship Rating Tool Existing Building Version 1.1 assessment tool, but indirectly for several benchmarks, it has met and is heading towards the implementation of green building.
2. From the results of the evaluation conducted with the assessment of the Greenship Rating Tool Existing Building Version 1.1 of the 6 existing criteria, among others:
 - a. Appropriate Land Use
 - b. Energy Efficiency & Conservation
 - c. Water Conservation
 - d. Material Source & Cycle
 - e. Air Quality & Indoor Comfort
 - f. Building Environmental Management

The value collected from the evaluation of the Greenship Rating Tool Existing Building Version 1.1 is 39. This value indicates that the DKI Jakarta Provincial Environment Agency has not implemented green building for the existing criteria. Many things need to be improved from the 6 (six) categories for the DKI Jakarta Provincial Environmental Service Office towards the implementation of the Green Building.

3. For the analysis of the questionnaires that have been distributed using the online filing method using Google Form, and 110 respondents who answered have been obtained, it is concluded that the respondents already know about the concept of implementing green building. Based on the respondent's assessment, it was found that the respondent was familiar with the existing categories Greenship Rating Tool Existing Building Version 1.1. Respondents have consciously implemented and followed the steps for implementing a green building, but due to limited media and facilities, not all of them can be applied.

4. It can be concluded that the employees in the DKI Jakarta Provincial Environmental Service Office are ready to implement green building but need to be supported by the provision of infrastructure and facilities that meet the green building category.

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