

Identification of Green Building Factors in Faculty of Engineering Building and Faculty of Fishery Building of Teuku Umar University

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ABSTRACT

Construction of buildings without considering environmental conditions such as the accuracy of land use, the use of energy (electricity), water and the use of building materials impact on the quality of life around it. This study aims to determine the criteria of green building based on the GreenShip-GBCI standard of building code. The object of research on the building Faculty of Engineering and Faculty of Fisheries by way of direct observation and verification interviews. Based on data collected and calculations on 41 GreenShip criteria from six categories: Appropriate Site Development (ASD), Energy Efficiency and Conservation (EEC), Water Conservation (WAC), Material Resource and Cycle (MRC), Indoor Health and Comfort (IHC) and Building Environment Management (BEM), Faculty of Engineering building and Faculty of Fisheries building total points of 29 points from 117 maximum points consisting of ASD; EEC; WAC; MRC; IHC and BEM respectively are 9; 1; 0; 6; 10; and 5 points. The highest IHC category value is 10 points, while the lowest category of EEC is 0. Based on the identification results indicate that the building has not met the criteria as a building that was built to apply the concept of Green Building.

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1. INTRODUCTION

The development of buildings is one of the largest contributors to global warming. This is seen in the use of building materials derived from non-renewable natural resources, as well as the use of Ozone Depleting Substances (ODS) [1]. Development in urban areas to date continues to grow rapidly in support of economic development that requires a lot of new constructions, especially building. For example the construction of business centers, office buildings, educational buildings, and so on. If the construction of infrastructure continues to be built without considering or considering environmental conditions such as the accuracy of land use, the use of energy (electricity), water and the use of building materials will certainly have an impact on the quality of life around it. This is what is considered to have a major role to the increase of global warming, so awareness and knowledge of the perpetrator of the construction of the influence of the existence of the building is needed. In 2030 it is estimated that almost 1/3 of the world's total CO₂ emissions and Building Buildings spend more than 1/3 of the world's resources on construction uses 40% of global energy, generates 40% of total greenhouse gases and uses 12% of total water supply.

Development is very influential on the sustainability and environmental quality because it uses various types of natural resources. Exploitation of natural resources that do not pay attention to environmental capacity and carrying capacity can lead to deterioration of environmental quality. The connection with environmental

quality issues is the issue of global warming in which the building becomes one of the causes of global warming because the building has the potential to produce carbon gas emissions more than 40% [2]. Solution to overcome global warming in the construction sector is to build green building. In Indonesia green building has not been built since the government has not set the obligation to build green building as a whole. Green building rating systems are designed to assess and evaluate the performance of buildings in whole or part of the building from the planning, construction and operation stages [3].

In dealing with that condition, the concept of Green Building emerged as a solution. Green Building is a building concept where the structure and process are built responsibly to the environment and resources as efficiently as possible. The establishment of Green Building Council Indonesia (GBCI) as an internationally recognized certification body is also inseparable from the government's efforts to promote environmentally friendly buildings that are able to overcome the impact of development. Green building is a building that applies environmental principles in designing, developing, operating and managing them in an important aspect of handling climate change impacts [4].

Eco-campus program is one of the programs that support to implementation of green buildings in the campus environment that also play a role in reducing global warming. Currently Development is done in Teuku Umar University one of them is the Faculty of Engineering and Faculty of Fisheries, the construction of this building will create professional academic chips with a wide scope so as to provide positive things both for lecturers and students.

2. RESEARCH METHOD

This research was conducted specifically in Faculty of Engineering Building and Faculty of Fisheries Building of Teuku Umar University (UTU) located on AluePenyareng road of West Aceh Regency, with coordinate point 4°8'40.38"N and 96°11'46.44"E. The building was built on 2015, currently functioned as lecture room and administration room (academic).

2.1. Method of collecting data

Direct observation The researcher performs direct measurement on the research object that is Faculty of Engineering building and fishery faculty where the researcher directly observe the sections listed in the measurement of Greenship criteria in staff room, faculty room, study room and toilet for assessment that need to be observed well and requires accurate, accurate observation.

Interviews utilize potential sources of information and opinions from building occupant resources that know staff, faculty, and students who daily observe and occupy this building. The instruments used in this study are questionnaire sheets, checklist, notebook, pen and also software guidelines Greenship rating tools 1.0.

2.2. Data analysis

In this study, the variables observed on the performance measurement criteria of the Green Building Faculty of Engineering Building and the Faculty of Fisheries, refer to the GBCI Greenship for the Built Building. Therefore, the variables consist of 6 (six) building feasibility matrices, 10 prerequisite criteria, and 41 credit criteria.

3. RESULTS AND ANALYSIS

In this study, an assessment was conducted on the building of Faculty of Engineering Faculty of Fisheries and Teuku Umar University with Greenship rating tools GBCI version 1.0 which consist of Appropriate Site Development (ASD), Energy Efficiency & Conservation (EEC), Water Conservation (WAC), Materials Resource and Cycle (MRC), Indoor Health and Comfort (IHC), and Building Environment Management (BEM). The following is the matrix of interview results with users and building managers related to criteria and Prerequisites of Greenship Assessment for Building Built against Building Faculty of Engineering Faculty of Fisheries and Teuku University Teuku Umar.

3.1. Appropriate Site Development (ASD)

The results of the assessment on the appropriate aspects of land use (ASD) conducted at the Engineering and Fisheries Faculty Building Teuku Umar University showed that the acquisition value points are 8 points from the maximum score of 16 points so that it has met 45% of the rating set in the GBCI greenship.

Table 1. Appropriate Site Development (ASD)

No	Credit Criteria	Point evaluation	Point
1	Community Accessibility	2	1

2	Motor Vehicle Reduction	1	0
3	Bicycle	2	0
4	Site Landscaping	3	3
5	Heat Island Effect	2	1
6	Stormwater Management	2	2
7	Site Management	2	1
8	Building Neighbourhood	2	1
	Total	16	9

3.2. Energy Efficiency & Conservation (EEC)

The results of the assessment on the EEC aspects of the Engineering and Fisheries Faculty of Teuku Umar University showed that the lack of information on the EEC aspects in the review of the acquisition of value points obtained.

Table 2. Energy Efficiency and Conservation (EEC)

No	Credit Criteria	Point evaluation	Point
1	Optimized efficiency building energy performance	16	0
2	Testing, recommissioning or retrocommissioning	2	0
3	System energy performance	12	0
4	Energy monitoring and control	3	0
5	Operation and maintenance	3	0
6	On site renewable energy	5 (bonus)	0
7	Clean energy	3 (bonus)	0
	Total	36	0

3.3. Water Conservation (WAC)

The results of the assessment on the water conservation aspect (WAC) that has been done show that currently the building of Engineering and Fisheries Faculty Teuku Umar University has earned 0 points from a maximum of 20 rating points set Greenship GBCI for this category. Results of WAC category analysis based on Greenship rating tools GBCI.

Table 3. Water Conservation (WAC)

No	Credit Criteria	Point evaluation	Point
1	Water Sub-Metering	1	0
2	Water Monitoring Control	2	0
3	Fresh Water Efficiency	8	0
4	Water Quality	1	0
5	Recycled Water	5	1
6	Potable Water	1	0
7	Deep Well Reduction	2	0
8	Water Tap Efficiency	2 (bonus)	0
	Total	20	1

3.4. Materials Resource and Cycle (MRC)

The results of the assessment on the source and cycle aspects of the material or MRC that has been done shows that the current building of Engineering and Fisheries Faculty Teuku Umar University has fulfilled 23% get 2 points from a maximum of 12 points rating set Greenship GBCI for this category. This aspect is very important to be applied because this aspect is very closely related in maintaining the quality of air and environment around Faculty of Engineering Building and Faculty of Fisheries. So the strategy needed to implement the MRC category. The results of the overall analysis of the MRC category based on the greenship are shown on.

Table 4. Materials Resource and Cycle (MRC)

No	Credit Criteria	Point evaluation	Point
1	Non ODS Usage	2	2
2	Material Purchasing Practice	3	2
3	Waste Management Practice	4	2
4	Hazardous Waste Management	2	0
5	Management of Used Good	1	0
	Total	12	6

3.5. Indoor Health and Comfort (IHC)

The results of the assessment on the Indoor Health and Comfort (IHC) that has been done shows that the current building of Engineering and Fisheries Faculty Teuku Umar University has obtained 10 points from a maximum of 20 rating points set Greenship GBCI for this category. IHC category analysis results based on Greenship rating tools GBCI.

Table 5. Indoor Health and Comfort (IHC)

No	Credit Criteria	Point evaluation	Point
1	Outdoor air introduction	2	1
2	Environmental tobacco smoke	2	0
3	CO2 and CO	2	0
4	Physical chemical and pollutants	6	6
5	Biological Pollutans	3	0
6	Visual convort	1	1
7	Acustic level	1	1
8	Building User survey	3	2
	Total	19	10

3.6. Building Environment Management (BEM)

After analyzed, it is found that from all criteria and benchmarks that have been applied, the existing condition of building environmental management (BEM), indicates that the current building of Engineering and Fisheries Faculty Teuku Umar University earn 5 points from a maximum of 13 points.

Table 6. Building Environment Management (BEM)

No	Credit Criteria	Point evaluation	Point
1	Innovation	5	2
2	Design intent & owner project	2	1
3	Green operational	2	1
4	Green occupancy/lease	2	0
5	Operation and maintenance	2	1
	Total	13	5

For the overall result obtained credit criteria points from 6 categories of greenship rating tools for Faculty of Engineering and Teuku Umar University building.

Table 7. Result of credit criteria point

No	Credit Criteria	Point evaluation	Point
1	ASD	16	8
2	EEC	36	0
3	WAC	20	0
4	MRC	12	6
5	IHC	20	10
6	BEM	13	5
	Total	117	29

The highest score in the IHC category is 10 points, and the lowest in the EEC and WAC categories is 0, in Greenship GBCI to be certified green building must meet other Greenship benchmarks.

4. CONCLUSION

From the measurement and analysis of green building criteria assessment based on the Greenship assessment tool for the Built Building of Faculty of Engineering and Fisheries Faculty of Teuku Umar University, the following conclusions are obtained:

1. Of the 41 criteria in the Greenship category, Faculty of Engineering and Fisheries Faculty of Teuku Umar University is 30 points from 117 maximum points, consisting of ASD = 8, EEC = 0, WAC = 1, MRC = 6, IHC = 10 and BEM = 5 points, so it cannot be said Green building according to Greenship.
2. The Faculty of Engineering and Faculty of Fisheries Teuku Umar University has not fulfilled some of the prerequisites of each Greenship category, including: for EEC and WAC categories do not meet one of two prerequisites, for ASD, MRC, IHC, BEM categories have fulfilled one of the two prerequisites.
3. The highest score on the IHC category is 10 points, and the lowest in the EEC and WAC categories is 0, in Greenship GBCI to be certified green building must meet other Greenship benchmarks. In order to achieve the minimum point is hinted at 35 points (bronze).

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