

An Assessment on Green Campus Rating of the University of Lampung Main Campus

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Abstract

Currently, people perceive higher education as an industry that operates within a specific area. Therefore, the concept of a green campus can be linked to the concept of a green neighborhood. The purpose of this assessment is to find out whether the University of Lampung main campus meets the criteria of the Greenship Neighborhood Rating Tool. The research data was obtained primarily based on observations, along with secondary data in the form of formal documents such as the campus master plan. The assessment result shows, despite the fact that the campus has implemented principles of green campus concept, it has not been able to obtain even the lowest rank of the tool. With a score of 38 out of a total of 117 points, or 34.48%, it is only a small difference to achieve a bronze rank. The assessment results led to the formulation of a set of cost-free management solutions aimed at transforming the campus area into a green campus neighborhood. By improving community welfare, movement, and connectivity, as well as land ecology criteria, it is expected that the score would increase by 22 points, resulting in a Silver Rank that can be achieved.

Keywords: Green Campus, Greenship Rating Tool, Management Solution.

I. INTRODUCTION

INCREASINGLY, environmental problems require serious implementation of green concepts to ensure their sustainability for future generations. Global efforts are underway to increase awareness of these problems and promote the wise and sustainable use of natural resources, particularly energy. In the construction sector, efforts include saving and selecting building materials, as well as savings in electricity and water. This movement is known as the Green Building Movement. In Indonesia, the government has started various national movements for environmental awareness and energy savings. Furthermore, there is already an organization that cares about the implementation of green buildings in Indonesia, namely the Green Building Council Indonesia (GBCI), which also has the authorization to issue green building certification. However, a study by Surjanah and Ardiansyah [1] shows only a few (less than 5%) of buildings in Indonesia fulfil the environmentally friendly building criteria.

A wider scope of the green concept is applied to a region or city. The concept of a sustainable city is known as a green city, resilient city and several other titles. In an area that is smaller than a city, the concept is known as green environment or green

neighbourhood. According to Achmad [2], a green environment is an area that is planned and designed in an integrated manner with priority given to the protection when consuming of natural resources by implementing green technology and recycling.

Currently, world campuses have long implemented the concept of an environmentally friendly campus – an eco-campus or green campus. It is the time for the University of Lampung to start implementing this concept. However, based on a study conducted by Kustiani, et al. [3] shows that even the most important building in this campus, the Rectorate Building, has not been able to meet even the lowest criteria of GBCI's Greenship for Existing Building version 1.1 [4].

A crucial aspect in green building and green neighbourhood concepts is saving and conserving energy and natural resources. Despite the fact that the University of Lampung has committed to improve the performance of its campus as a sustainable green campus by making efforts including: establishing a Sustainable Development Goals (SDGs) Center, obtaining ISO 140001:2015 certification on Environmental Management System, participating in the Green Metric University Ranking competition, building various facilities and conducting various programs in supporting the green movement. However,

The University of Lampung's main campus - the Gedong Meneng Campus - is almost 100% dependent on electricity supply from the Country Electricity Company (Perusahaan Listrik Negara - PLN) and 100% of its water sourced from groundwater.

As a follow-up to these efforts, it is necessary to assess performance of the Gedong Meneng Campus as a green neighbourhood based on the GBCI's national standards and certification body. The results of this assessment can be used as a benchmark or reference as well as policy in developing an eco-campus program.

II. MATERIALS AND METHODS

The research utilizes a quantitative method, in which according to Priadana & Sunarsi [5], is a scientific and systematic procedure to measure parameters and phenomena and their relationships. A case study approach was carried out in which according to Coombs [6], it is capable to generate an in-depth understanding of a contemporary issue or phenomenon in a bounded system. According to Creswell & Poth's [7], a single case study (one bounded case) was deliberately chosen since it can illustrate the issue or concern; and based on Elvera & Astarina's [8] opinion, it is with a certain consideration. In this case, the selected one was the Gedong Meneng Campus and the concern was the campus performance on green campus application. It is interesting to study this campus since the initial master plan was designed 'conventionally' not a "sustainable area"; and the Researcher wanted to find out whether the campus could achieve performance as a green neighbourhood and could meet the minimum requirements as a green area.

Furthermore, the assessment on performance was carried out on various variables, parameters, criteria or categories. Based on Ulfa's [9] theory these variables, parameters, criteria or categories is an object, trait, attribute or value of a person or activity and has various variations between one another. The researcher or assessor determine these categories with the aim of studying and drawing conclusions. The tool used to score the parameter of the green campus performance was GBCI's Greenship Rating Tools for Neighbourhood version 1.0 [10]. The categories that will be measured in this case study refer to the categories determined by the GBCI as can be seen in Table 1.

As mention befor, the case study was the Gedong Meneng Campus. The campus located in Jalan Prof. Dr. Ir. Sumantri Brojonegoro Nomor 1, the City of Bandar Lampung, Indonesia. It began operating in 1973 and has an area of 77 hectares. The following is the layout of the campus.



(Source: Campus Master Plan, 2017)

Figure 1. Layout of the Gedong Meneng Campus, the University of Lampung

The GBCI divides areas into four types, namely: mixed use, commercial, residential and industrial areas. The Gedong Meneng Campus is considered as an industrial area because currently higher education is seen as a product and service industry based on knowledge and skills. Furthermore, higher education operations are carried out in an area called a campus in which education activities and facilities be managed to provide optimal learning opportunities to produce products that are in demand by society. In order the campus entitled to be assessed using the Greenship Neighborhood Rating Tool as an industrial area, it must also have the following requirements set by GBCI: the land area of the campus is at least 50 hectares, consists of a minimum of two buildings and is managed by one manager. These three conditions can be fulfilled by the Gedong Meneng Campus.

The assessment utilizes primary data in which according to Rahmadi [11] is the data obtained from the first source (original source) at the research location; and secondary data in which based on Sugiyono's [12] opinion is obtained indirectly by other data collectors. For this study, primary data was obtained based on direct observation and measurements and secondary data was collected from related documents. Furthermore, data was analysed using a Quantitative Descriptive Analysis using Scoring. Descriptive Analysis are used to present quantitative descriptions in a manageable form. In a research study, a number of categories may have to measure. It helps to simplify large amounts of data in a sensible way. The tool used to assess and score was the Greenship Neighbourhood Rating Tools version 1.0. The tool provides a set of measurements of categories and scoring/points for each category as can be seen in Table 1.

After the point or weight for each category was obtained and totaled, the rating achieved was determined based on the Table 2. There are four levels of GBCI's Greenship Neighborhood ratings. This rating reflects how far the Greenship Neighborhood concept is applied to the Area.

Table 1. Categories in GBCI's Greenship Neighbourhood Rating Tools

Category	Score	Weight
Land Ecological Enhancement (LEE)	17	14,53%
Movement and Connectivity (MAC)	26	22,22%
Water Management and Conservation (WMC)	16	13,68%
Solid Waste and Material (SWM)	16	13,68%
Community Wellbeing Strategy (CWS)	14	11,97%
Building and Energy (BAE)	17	14,52%
Innovation and Future Development (IFD)	11	9,40%
Total Score	117	100,00%

Table 2. Ratings of Greenship Neighborhood version 1.0

Rating	Percentage	Minimum Point
Platinum	73%	90
Gold	57%	71
Silver	46%	57
Bronze	35%	43

Source: GBCI, 2015

Based on these results, recommendations can be provided regarding policy, strategy and phases that can be taken by the management of the Gedong Meneng Campus management on how to improve the performance/rating on Greenship Neighborhood or Green Campus Implementation.

III. RESULTS AND DISCUSSIONS

A. Level of Achievement on the Greenship Neighborhood Concept of the Campus

The assessment carried out at the Gedong Meneng Campus using the Greenship Neighbourhood Rating Tool version 1.0, obtained achievement point of seven categories of Greenship Neighbourhood of the Gedong Meneng Campus as shown in Table 3.

Performance on Land Ecological Enhancement (LEE)

Campus area (neighbourhood) development must be able to support neighbourhood sustainability and spatial quality at a macro level, without reducing the ecological quality of the area. The provision of green open space (ruang terbuka hijau - RTH) is necessary to create a healthy environment for the civitas academica and to improve the quality of the microclimate around the campus area as well as to reduce the urban heat island

(UHI). Efforts to preserve biodiversity in campus forests or parks are also necessary for the continuity of native species (flora and fauna) as the supporting elements of the campus environment carrying capacity. Based on field survey data and other supporting documents, the assessment results on this category achieved a score of four out of 17 points or 3,42%.

Performance on Movement and Connectivity (MAC)

According to Tamin [13], movement is the effort to move (people or goods) using certain tools from a location (transportation). Educational activities require movement in order to be carried out. Some of the things emphasized are making pedestrians a priority, opening access of the campus area for easy access for everyone, as well as providing various infrastructure and facilities to support the mobility of the civitas academica. Differences in the activities and behaviour of road trippers produce different movement patterns. Therefore, different areas have different movement patterns.

Meanwhile, connectivity means connecting with all facilities and infrastructure to provide convenience and flexibility so that energy and cost efficiency can be achieved, as well as encouraging healthy lifestyle patterns for the civitas academica and reducing dependency on the use of private vehicles. The level of connectivity depends on the condition of the road network. The more roads that are connected, the better the connectivity will be. The performance of the campus neighbourhood on this category was 12 out of 26 points or 10,26%.

Performance on Water Management and Conservation (WMC)

Measurement on this category is intended to raise awareness of the importance of understanding the potential of existing water sources, how much clean water is needed, and how to manage it. All those three are important to maintain a balance between needs and future availability. Efforts on managing and conserving campus neighbourhood water resources include: campus wastewater treatment, consume independent alternative water resources such as rainwater, as well as utilizing an integrated rainwater runoff management system to reduce the burden of urban drainage and conserving water body buffer zones. The performance measurement on this category shows that the Gedong Meneng Campus is able to achieve seven out of 16 points or 5,98%. It is worth noted that WMC 3 – Water Body and Wetland Preservation sub-criterion was not assessed (n.a. – not applicable) since there are no wet land or river in the campus area.

Table 3. Point Achievement of Greenship Neighbourhood for Gedong Meneng Campus

No.	Category	Point			
		Max.	Achieved	Max. (%)	Achieved (%)
1.	Land Ecological Enhancement (LEE)				
	a. LEE P – Basic Green Area	P			
	b. LEE 1 – Green Area for Public	4	4		
	c. LEE 2 – Habitat Conservation	6	0		
	d. LEE 3 – Land Revitalization	4	0	14,53	3,42
	e. LEE 4 – Micro Climate	3	0		
	f. LEE 5 – Productive Land	n.a.	n.a.		
	Total	17	4		
2.	Movement and Connectivity (MAC)				
	a. MAC P1 – Productive Land	P			
	b. MAC P2 – Pedestrian Network and Facilities	P			
	c. MAC P3 – Connected Area	P			
	d. MAC 1 – Walkway Desain Strategy	10	2		
	e. MAC 2 – Public Transportation	6	4	22,22	10,26
	f. MAC 3 – Public Utilities and Amenities	2	2		
	g. MAC 4 – Universal Accessibility	3	2		
	h. MAC 5 – Bicycle Network and Storage	3	0		
	i. MAC 6 – Shared Car Parking	2	2		
	Total	26	12		
3.	Water Management and Conservation (WMC)				
	a. WMC P – Water Schematic	P			
	b. WMC 1 – Alternative Water	6	0		
	c. WMC 2 – Stormwater Management	7	7	13,68	5,98
	d. WMC 3 – Water Body and Wetland Preservation	n.a.	n.a.		
	e. WMC 4 – Waste Water Management	3	0		
	Total	16	7		
4.	Solid Waste and Material (SWM)				
	a. SWM P – Operational Phase SW Management	P			
	b. SWM 1 – Advance SW Management	6	6		
	c. SWM 2 – Construction Waste Management	4	1	13,68	5,98
	d. SWM 3 – Reg. Material for Road Infrastructure	4	0		
	e. SWM 4 – Recycle & Reuse Materials for Road Infrastructure	2	0		
	Total	16	7		
5.	Community Wellbeing Strategy (CWS)				
	a. CWS 1 – Amenities for Communities	2	2		
	b. CWS 2 – Social and Economic Benefit	4	2		
	c. CWS 3 – Community Awareness	4	0	11,67	5,13
	d. CWS 4 – Mixed Use Neighborhood	0	0		
	e. CWS 5 – Local Culture	2	2		
	f. CWS 6 – Safe Environment	2	0		
	Total	14	6		
6.	Building and Energy (BAE)				
	a. BAE 1 – Greenship Buildings	6	0		
	b. BAE 2 – Affordable Housing	n.a.	n.a.		
	c. BAE 3 – Energy Efficiency	4	0	14,53	0,00
	d. BAE 4 – Alternative Energy	3	0		
	e. BAE 5 – Light Pollution Reduction	2	0		
	f. BAE 6 – Noise Pollution Reduction	2	0		
	Total	17	0		
7.	Innovation and Future Development (IFD)				
	a. IFD 1 – Greenship Professional (GA/GP) Empowerment	3	0		
	b. IFD 2 – Estate management	2	2	9,40	1,71
	c. IFD 3 – Innovation	6	0		
	Total	11	2		
Total Point		117	38	100	32,48

Performance on Solid Waste and Material (SWM)

Solid waste management in the campus neighbourhood is important to reduce the burden of campus environment as well the city's final landfill. Providing integrated facilities and management in the area is necessary to ensure environmentally friendly waste management treatment. Apart from solid waste management, this criterion also addresses the selection of materials used in infrastructure and facilities development. Using domestic materials, recycled materials or reusing materials in infrastructure can reduce the carbon footprint and encourage domestic economic growth. The campus performance on this category was seven out of 16 points or 5,98%.

Performance on Community Wellbeing Strategi (CWS)

Since the civitas academica is an important element of the campus neighbourhood, they become stakeholder in campus development including those related to campus business development plans. Therefore, this criterion encourages efforts in improving the welfare of the civitas academic, facilitating the civitas academica to interact and carry out activities, as well as maintaining areas that are safe from crime and natural disasters.

Apart from that, promotion and socialization of sustainable lifestyles of the civitas academica can create dynamic social interactions. Areas that maintain local cultural character should also be appreciated for maintaining neighbourhood characteristics and preserving cultural diversity in Indonesia. Based on field survey data and other supporting documents, the assessment results on this category achieved a score of six out of 16 points or 5,13%.

Performance on Building and Energy (BAE)

This category encourages neighbourhood that implement green building as a unified element of green development, energy savings in the area, alternative energy usage, as well as reduction of noise and light pollution. It is also worth noted that BAE 2 - Balanced Occupancy was not assessed (n.a. – not applicable) since the campus area is dominantly for education purposes and is not an area with a balanced occupancy. However, there were affordable student dormitories and housings for junior lecturer for sure. alternative energy usage, as well as light and noise pollution reduction. Unfortunately for this category, the campus did not get point at all since there were very little or no effort at all for energy efficiency,

Performance on Innovation and Future Development (IFD)

To ensure proper implementation of the concept of sustainability in the campus area in the future, it is necessary to establish formal guidelines in the planning of environmentally friendly campus areas. Furthermore, innovations are also encouraged to flourish environmental, social and economic functions of the campus. Utilizing certified professional of Greenship Associates (GA) and Greenship Professionals (GP) is necessary to help establish the policy, innovation and the direction in developing the green campus master plan. The results of the assessment for this category shows that the performance achieved was two out of 11 points or 1,71%.

B. Recommendations for Improving the Campus Performance

From the discussion above, it is known that the total point achieved by the Gedong Meneng Campus on the seven categories of the Greenship Neighbourhood Rating Tool version 1.0 was 38 points out of a maximum of 117 points or 32.48%. This result shows that the campus still unable to meet the lowest requirements as a green neighbourhood, which is 43 points (35%) for Bronze Rating.

According to Gunagam, Naurah, & Prabono [14], to improve the campus performance, it is necessary to involve experts in the policy and master plan development, in the design and construction of infrastructures, building and facilities; as well as it is necessary to acknowledge the role of all stakeholders in practicing sustainable principles. On the other hand, there are two broad types of solutions for improving the performance that asset solutions (physical asset) and non-asset solutions (management). Asset solutions require capital expenditure for the construction of facilities and infrastructure; while the non-asset solutions require managerial improvements without involving capital spending. Example of recommendations for non-asset solutions can be seen in Table 4 below. These recommendations, if properly implemented, are able to add 22 points to the performance of the campus greenship neighbourhood. This makes the campus points increase to 60 points and makes the rating increase to Silver.

Table 4. Recommendations for improving the Greenship Neighborhood performance of the campus

Code	Sub-category	Recommendation	Point
LEE 2	Habitat Conservation	a. Planting local trees and/or shrubs on at least 30% of total public space and increasing the diversity of local fauna b. Carrying out a routine agenda of planting a minimum of 10 young tree saplings, for each tree in the area that has fallen and been uprooted	4
MAC 1	Walkway Desain Strategy	a. Provide zebra crossings at every road intersection b. Provide shading at least 60% of the entire pedestrian path. Shading can be in the form of natural trees or artificial shade.	2 2
MAC 5	Bicycle Network and Storage	a. Provide curbs or delineator posts along bicycle paths so they are free from parallel contact with motorized vehicles. b. Provide safe bicycle parking at gates, parks, or location to change public transportation modes.	3
CWS 2	Social and economic benefit	Organizing civitas academica satisfaction surveys regarding the quality of the environment and campus facilities. An effective response mechanism of complain or dissatisfaction is also provided consistently.	2
CWS 3	Community Awareness	Organizing a minimum of three sustainable lifestyle promotions in the campus in a consistent manner.	4
CWS 6	Safe Environment	Provide maps and evacuation routes to ensure safety	2
IFD 1	Greenship Professional (GA/GP) Empowermen	a. Involving GA certified experts to lecture on green development issues for campus neighbourhood development management. b. Involving GP certified experts who are responsible for to guide neighbourhood sustainability and Greenship certification process.	3
Total Point			22

IV. CONCLUSIONS

Based on the previous discussion, the results of the study on the performance on green campus achievement of the Gedong Meneng Campus using GBCI's Greenship Neighborhood Version 1.0. Gedong Meneng Campus has made efforts to implement the principles of sustainable green campus, however the performance on implementing the GBCI's Greenship Neighbourhood has only been able to achieve 38 out of 117 points or 32.48%. Based on this result, the Gedong Meneng Campus is still unable to meet even the lowest rating, that is Bronze Rating, of the Greenship Neighborhood. This performance can be improved in two ways, namely asset solutions (physical asset) and non-asset solutions (management). Non-asset solutions do not require large capital investments. Based on the analysis above, management solutions/non-asset solutions on the categories of Community Welfare, Movement and Connectivity and Improvement of Land Ecology, are able to increase performance achievements by 22 points. With a total performance of 60 points, the Gedong Meneng Campus deserves a Silver Rating. It is recommended for the Gedong

Meneng Campus to involve GA/GP experts to develop policies, strategies, plans and programs to improve the performance of the campus related to green campus neighbourhood and subsequently be certified by an official organization related to green campuses.

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