Available online at: https://proceeding.researchsynergypress.com/index.php/cset
RSF Conference Series: Engineering and Technology
ISSN 2809-6843 (Online) | 2809-6878 (Print)
Volume 1 Number 2 (2021): 74-85

Evaluation of the Application of The Green Campus Concept at Universitas Budi Luhur Based on UI Greenmetric Category

Hakim[1], T. Endangsih[2]

[1,2]Architecture Study Program, Faculty of Engineering, Universitas Budi Luhur, Indonesia

Abstract

The green campus concept begins with the awareness of the academic community about the importance of various environmentally-friendly activities to support a sustainable campus. A sustainable campus is expected to be able to withstand change without harming the future academic community and the people living around the campus. This study aims to determine the application of the green campus concept at Universitas Budi Luhur with qualitative research methods through a rationalistic approach. For data processing used scoring method and mixed research methods. Universitas Budi Luhur registered itself as a participant in the Green Campus ranking program coordinated by the UI GreenMetric Team in 2019. In this study, the data processed was data from ranking results whose scores were announced in 2019 and 2020. The results of scoring in 2020 Universitas Budi Luhur earned a total of 5,850 points and was ranked 355th in the world level. The standard category of campus arrangement and infrastructure, the fulfillment of renewable energy, the absence of recycled water treatment efforts, and the use of water-saving devices have not been maximized, causing the percentage of assessment to be below. With the results of the 2020 ranking, it is hoped that it will be a spirit for a better future and there is a need for commitment from the management in determining policies related to the green campus program for campus sustainability.

Keywords: Green Architecture, Sustainable Campus, Standards, UI GreenMetric

INTRODUCTION

The role of universities as catalysts for sustainable development is very important based on their function in carrying out the tridharma of higher education, namely teaching and learning activities, research and community service that can be in line with the concept of sustainability. The contribution of universities at this time can also be seen from their efforts to create an environmentally friendly campus, with various standards and indicators that have been set by several world institutions. One of the international institutions concerned with realizing a sustainable campus is the UI Green Metric World University Rankings.

The institution that carries out the World University Ranking based on the campus Sustainability Metric, is an initiative of the University of Indonesia which was launched in 2010. This sustainable campus ranking aims to provide online survey results regarding current conditions and policies related to Green Campus and Sustainability at universities around the world. The existence of this ranking is expected to help university leaders and strategic stakeholders to pay more attention to sustainable development issues in the higher education sector.

The campus area is an inherent part of the city's ecosystem that plays a role in environmental sustainability (Lesmanawati, 2012). Thoughts on the concept of environmental sustainability have existed since two decades ago and various campuses around the world are competing to practice and inseminate the idea. (Hussin and Kunjuraman, 2015). Higher Education as the highest educational institution has an important role in realizing a sustainable future (Mcmillin and Dyball, 2009). The contribution of

Corresponding author
Hakim, hakim@budiluhur.ac.id
DOI: 10.31098/cset.v1i2.476

universities in realizing sustainability is implemented in at least three ways, namely through an environmentally friendly society (ecocommunity), increasing understanding and concern (ecoliteracy) and designing the built environment ecologically (ecodesign).(Chaerul and Susangka, 2011).

The predicate of a green campus or environmentally friendly campus can be achieved by applying sustainable principles by continuously protecting, managing and preserving the environment at higher education institutions.(Wimala, Akmalah and Rangga, 2016). According to Murtiyarini (2014), the criteria for realizing an environmentally friendly campus include the arrangement and infrastructure of the campus, the use of renewable energy and anticipation of global warming, integrated waste management and processing, water recycling and water use efficiency, the use of environmentally friendly transportation and the use of educational facilities. environmentally friendly(Murtiyarini, 2014).

Fatmawati & Syahbana (2015) state that the determination of sustainable development policies at each university or campus is based on the specific problems it faces and the needs of users who want to be accommodated.(Fatmawati and Syahbana, 2015). The program to preserve the environment in universities affects the formulation of policies and campus management because it will have an impact on the activities of the academic community on the environment, research, campus operations, and services to the community(Widiasih and Nuha, 2019).

LITERATURE REVIEW

Definition of Green Campus/Environmentally Friendly Campus

according to Abdurrahman in his research "Sustainable Development in the Management of Indonesia's Natural Resources" (2003), Green Campus is a concept that supports the concept of sustainable development. What is meant by sustainable development is development which in its implementation takes into account and considers environmental conditions (Abdurrahman, 2003). The concept of a green campus is in line with the concept of sustainable development, namely applying environmentally friendly principles to all activities carried out at the university. The application of environmentally friendly principles to the green campus concept, namely in academic activities, the commitment of campus managers in planning and formulating policies to implement environmentally friendly principles, and saving paper on-campus administrative activities. Not only that, but the green campus also seeks to plan the arrangement and infrastructure of the campus, paying attention to environmentally friendly transportation, saving electrical energy, waste management and processing, recycling water, and saving water use.

Green Campus Development in Indonesia

"UI GreenMetric World University Rankings", initiated by the University of Indonesia (UI) started in 2010 with the aim of promoting the concept of campus management that applies the concept of green campus to achieve a sustainable campus(UI GreenMetric Ranking Team, 2019). The ranking of the sustainable campus level is carried out through an online survey by filling out a questionnaire consisting of six standard categories equipped with supporting documents for answering the questionnaire. In general, the standard assessment is in the conceptual framework of economic aspects (profit and cost-saving), social aspects (education, community, and social involvement), and environmental aspects (natural resource use, environmental management, and pollution prevention). The determination of the ranking indicators and categories has gone through a feasibility test so that they can be relevant for all universities. In 2021 those who registered as participants in the UI GreenMetric ranking consisted of 95 universities from 35 countries. From

year to year, the number of participants has increased, as seen in 2018 there were 791 universities from 81 countries, this shows that a green campus is one of the priorities that must be carried out for campus sustainability in the future.

Indonesia already has a rating system design body for green campuses, namely UI GreenMetric which was established by the University of Indonesia. From the official UI GreenMetric website, there are 912 universities in the world registered as participants. 49 universities in Indonesia have been registered as campuses that have been assessed in the application of the green campus concept. The announcement of the branch in December 2020 named 5 universities in Indonesia that occupy the top 5 positions in the Indonesian version of UI GreenMetric, namely the Universitas Indonesia, Universitas Diponegoro, Universitas Gadjah Mada, Institut Pertanian Bogor, and Institut Sepuluh Nopember. Universitas Indonesia is ranked first in Indonesia, ranking 27 out of 912 universities from 84 countries.

Designing Agency Rating System for Green Campus

There are two rating system design bodies for Green Campus which are now used by universities in the world, namely The Association for the Advancement of Sustainability in Higher Education (AASHE) which issued the Sustainability Tracking Assessment and Rating System (STARS), and the University of Indonesia which published the UI. GreenMetric. The assessment categories in UI GreenMetric are more general and easy to apply to all universities, while those in STARS are more detailed. The STARS assessment can be accessed easily on the official website, while UI GreenMetric does not fully explain how the assessment is carried out. STARS and UI GreenMetric have different categories and ways of scoring. The assessment of the green campus category at STARS institutions through 5 categories (academics, engagement, operations, planning & administration, and innovation), then the 5 categories are divided into 19 indicators and detailed in 65 sub-indicators (Association for the Advancement of Sustainability in Higher Education, 2017). Meanwhile, the UI GreenMetric assessment consists of 6 categories (settings and infrastructure, energy and climate change, solid waste, water, transportation, and education) and is described in 39 indicators(UI GreenMetric Ranking Team, 2019).

In the preparation of the assessment components, UI GreenMetric uses the basic principles of sustainable development consisting of economic aspects, social aspects, and environmental aspects as described in Figure 1. From these three aspects, it can be described as follows; 1) environmental aspects discuss the use of natural resources, environmental management, and pollution control; 2) the economic aspect includes profit and efficiency of all activities on campus; 3) social aspects include education, community and social involvement. All aspects are interrelated to achieve a sustainable campus.

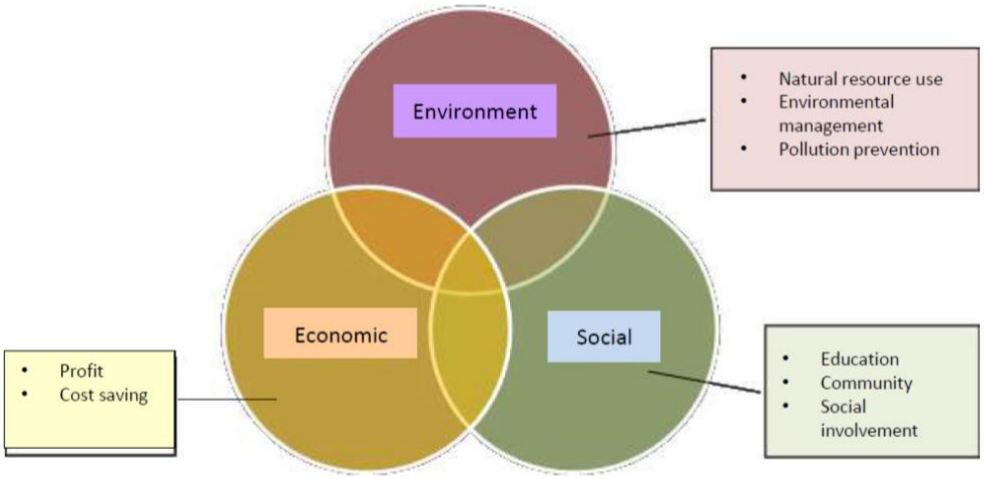


Figure 1. Sustainable Campus Component Based on UI GreenMetric

Source: Guideline UI GreenMetric World University Rankings, 2020

Figure 1 explains that the concept of a sustainable campus pays attention to three aspects, namely economic, social, and social environment. Higher education is one of the elements in urban facilities that have a strategic role in achieving sustainable development goals through the campus concept sustainable. The concept of a sustainable campus was later revealed by UI GreenMetric to assess campus efforts to create a sustainable campus through 6 assessment categories. The definition of sustainable development is the optimal use of resources (natural resources and human resources) to meet current, and future needs without harming future generations. (Gandasari, Hotimah and Miyarsah, 2020). Universities as an important part of the realization of sustainable development need to implement sustainable campus development that can become part of the culture and academic management on campus. The sustainability of the program can be achieved by the availability of policies that can accommodate values that are in line with sustainable development(Mason, 2003).

RESEARCH METHOD

The research locus is at Universitas Budi Luhur in the South Jakarta area, this was to evaluate the efforts that have been made to create a green campus that has been tested with the UI GreenMetric ranking assessment in 2019-2020. The description of the locus situation is as follows:


SITUATION MAP
Campus development planning
BUDI LUHUR UNIVERSITY
Site Plan
A. Monument budi luhur
B. Security post
C. Business unit
D. Office building unit 1 & 2
E. Building units 3 lectures
F. Building units 4 lectures
G. Building units 5 lectures
H. Building units 6 lectures
I. Aim
J. Rock climbing arena
K. Mosque
L. Auditorium
M Student activity unit building
N Basketball court
O. Generator building
P Canteen
Q. Café c now
R. Rectorate building (unit 7)
S. Foundation building
T. Kebudayaan center building
U. Ousdoor amphitheater
V. Skateboard arena
W. Supporting building
X. Building units 8 lectures
Y. Indoor sports
Z. Budi luhur horse stable
AA Toilet
AB Power house
AC Campus bus parking
AD Garbage Bank & Worishop
Expassion plan
1. Parking building 1
2. Parking building 2
3 Parking building 3
4. Building units 9 lectures
5. Smart house budi luhur
6. Boys dormitory building
7. Girls dormitory building
SITUATION MAP
SCALE 1:2000
U

Figure 2. The Campus Area Plan of Universitas Budi Luhur
Source: Blueprint Map Document of Universitas Budi Luhur , 2019

Figure 2 shows a comparison between the land area, the ground floor building area, and the open space area. as for total campus land area is 40,416 m2 with a total building area of 26,340 m2 and a total open space area of 26% of the total land area.

This study uses a qualitative method with a rationalistic approach. The holistic approach is carried out by using basic concepts with certain objects and producing larger concepts. The research activity aims to find out how the UI GreenMetric program is implemented at Universitas Budi Luhur in 2020. Concept analysis uses the UI GreenMetric guide parameters. There are six (6)

categories in the UI GreenMetric standard, namely Settings and Infrastructure (SI), Energy and Climate Change (EC), Waste (WS), Water (WR), Transportation (TR) and Research and Education (ED) (UI GreenMetric Ranking Team, 2019).

Table 1. Assessment Components in The UI GreenMetric Standard

No	Catagory	Maximum Point	Percentage of Total Points (%)
1	Setting and Infrastructure (SI)	1.500	15
2	Energy and Climate Change (EC)	2.100	21
3	Waste (WS)	1.800	18
4	Water (WR)	1.000	10
5	Transportation (TR)	1.800	18
6	Education (ED)	1.800	12
	TOTAL	10.000	100

Source: Guideline UI GreenMetric World University Rankings, 2020

After the results of interviews, observations and sufficient data needs, a review is carried out on how the UI GreenMetric category has been implemented. The usefulness of the data from the evaluation analysis on each indicator can be used as mitigation measures that can be taken to improve categories or indicators that require continuous improvement.

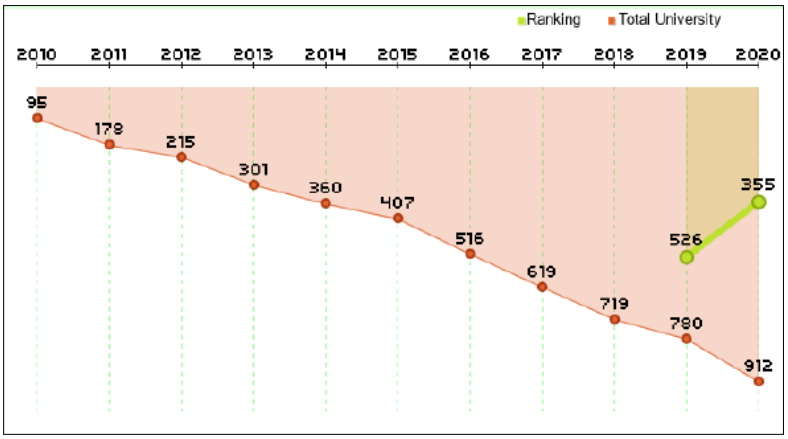
FINDINGS AND DISCUSSION

The success of universities in implementing the concept of a sustainable campus (Sustainability Campus) will have an impact on changing the paradigm of the campus community to be wiser and wiser in managing the environment.(Tiyarattanachai, Ronnachai and Hollmann, 2016). The Campus is one of the agents of change, therefore campus development must be supported by activities that support sustainable development programs. The efforts made by Universitas Budi Luhur in realizing a sustainable campus with a "Green Campus" approach need to be appreciated. The university carries the theme “Intelligent and Virtuous” which presents learning in line with the spirit of sustainable development. This can be seen from the seriousness of the institution in developing the green campus concept.

A green campus can be defined as a program that integrates environmental management and protection into the university. Green campus is a combination of environment and campus world in its management(Gholami *et al.*, 2020). The most common obstacle in implementing Green Campus is the lack of knowledge about green campuses and campus readiness to commit to protecting the environment. As the indicators that have been set in the UI GreenMetric standard, Universitas Budi Luhur tries to internalize the indicators into the Green Campus program in 2020.

The programs carried out are oriented towards sustainable environmental management, including efforts to save water, paper, and electricity, reforestation to achieve the ideal proportion of green open space (RTH), procurement of environmentally friendly means of transportation, optimization of waste houses and the construction of Wastewater Treatment Plants. IPAL) to prevent

water pollution in the campus area. As mentioned earlier, Universitas Budi Luhur experienced an increase in ranking from 526th position in 2019 and in 2020, Universitas Budi Luhur managed to rank 355th. world. Meanwhile, from the results of the special ranking for campuses in Indonesia, Universitas Budi Luhur managed to rank 32 National in 2020. the breakdown of the rankings from 2019 to 2020 can be seen in the following image:



Gambar 3. Total score for 2019 and 2020

Source: (UI GreenMetric Team World University Rankings, 2020)

In general, the ranking results are the result of improved follow-up to program implementation in 2019. In 2019, Universitas Budi Luhur received a total score of 4,550 for all categories, while in 2020 the University received a total score of 5,625.(UI GreenMetric Team World University Rankings, 2020). The complete assessment results are described in Figure 2 as follows:

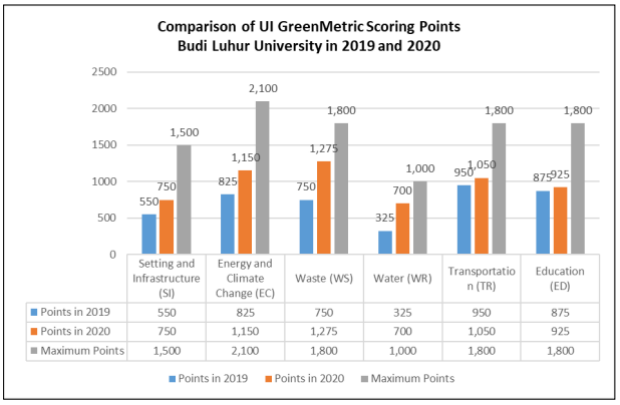


Figure 4. Comparison of UI GreenMetric Scoring Points

Universitas Budi Luhur in 2019 and 2020

Source: (UI GreenMetric Team World University Rankings, 2019 and 2020)

The data in figure 4 shows that there is a significant increase in points in the development of the Green Campus program from 2019-2020 at Universitas Budi Luhur, namely in the categories of Setting and Infrastructure (SI), Energy and Climate Change (EC), Waste (WS), and Water (WR). The assessment from UI GreenMetric from 2019 to 2020 has increased by 1,575 points. Transportation (TR) and Education (ED) categories were recorded, which did not increase significantly, between 50-100 points. Of the six assessment categories in 2020, which are still far behind their maximum points, namely Setting and Infrastructure (SI), Energy and Climate Change (EC). The following is a description of the category scoring that gets a less than maximum score as follows:

Setting and Infrastructure

Indicator		Score
SI.1	The ratio of open space area to total area	75
SI.2	Total area on campus covered in forest vegetation	50
SI.3	Total area on campus covered in planted	225
SI.4	Total area on campus for water absorption besides the forest and planted	200
SI.5	The total open space area divided by total campus population	0
SI.6	Percentage of university budget for sustainability efforts within a year	200

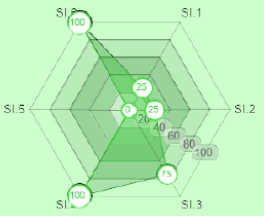


Figure 5.1 Percentage of Score to Maximum Score for Setting and Infrastructure

Energy and Climate Change

Indicator		Score
EC.1	Energy efficient appliances usage	150
EC.2	Smart building implementation	75
EC.3	Number of renewable energy source in campus	150
EC.4	Total electricity usage divided by total campus population	300
EC.5	The ratio of renewable energy production divided by total energy usage per year	0
EC.6	Elements of green building implementation as reflected in all construction and renovation policies	150
EC.7	Greenhouse gas emission reduction program	100
EC.8	Total carbon footprint divided by total campus population	225

Figure 5.2 Percentage of Score to Maximum Score for Energy and Climate Change

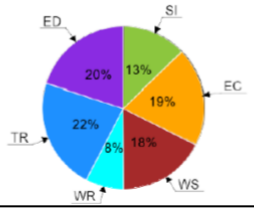
Figure 5. Scores In The Settings And Infrastructure (SI), Energy And Climate Change (EC) Categories Year 2020

Source: (UI GreenMetric Team World University Rankings, 2020)

Figure 5 describes the Setting and Infrastructure (SI) category, the total area on campus covered by forest vegetation > 22 - 35% is still less than the standard, which is > 35%. In addition to the area covered by forest vegetation, the value is low, namely the total area of open space divided by the total campus population to meet oxygen needs. Therefore, it needs to be improved by planting forest vegetation in open spaces that have not been used properly, while the green open space can be added by maximizing the open space currently used for motorcycle parking.

In the Energy and Climate Change (EC) category, the implementation of smart building is still not well implemented, this is due to the comparison between the building area that implements smart building <25% of the total building area. it means that the application of Smart Building has not been implemented is still low. In 2020 Universitas Budi Luhur has not implemented a smart building system. However, several building facilities have used the latest technology that is more environmentally friendly and energy efficient, such as the use of LED lights, street lighting that uses solar cells, the application of automatic lights in several toilets (lights turn on if someone is used) , etc. to increase the score on the implementation of smart buildings need to be increased in other facilities and applied to all existing buildings In addition to implementing smart buildings in the Energy and Climate Change (EC) category, the production ratio renewable energy applied on campus has not met the population that will benefit please. Universitas Budi Luhur has implemented alternative energy solar cells for street lighting at several points, processing organic waste into biogas which can be used as alternative fuel. So it is necessary to increase research on renewable energy to meet electrical energy and be applied to all buildings. This is expected to save energy and reduce costs for electricity. The following is a description of the results of the percentage assessments from all categories in the UI GreenMetric standard:

Category	Point	Percentage of Point to Total Score	Maximum Point	Percentage of Point to Maximum Point
Setting and Infrastructure (SI)	550	13 %	1500	36.67 %
Energy and Climate Change (EC)	825	19 %	2100	39.29 %
Waste (WS)	750	18 %	1800	41.67 %
Water (WR)	325	8 %	1000	32.50 %
Transportation (TR)	950	22 %	1800	52.78 %
Education (ED)	875	20 %	1800	48.61 %
Total Score	4,275	100 %	10000	42.75 %



Category	Point	Percentage of Point to Total Score	Maximum Point	Percentage of Point to Maximum Point
Setting and Infrastructure (SI)	750	13 %	1,500	50.00 %
Energy and Climate Change (EC)	1,150	20 %	2,100	54.76 %
Waste (WS)	1,275	22 %	1,800	70.83 %
Water (WR)	700	12 %	1,000	70.00 %
Transportation (TR)	1,050	18 %	1,800	58.33 %
Education (ED)	925	16 %	1,800	51.39 %
Total Score	5,850	100 %	10,000	58.50 %

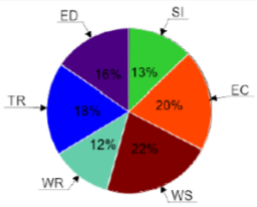


Figure 6. Results Of The UI GreenMetric Assessment Of Universitas Budi Luhur 2019 And 2020

Source: (UI GreenMetric Team World University Rankings, 2020)

The results of the weighting of each indicator in 2020 for Universitas Budi Luhur in the UI GreenMetric ranking present data that the Waste Category (WS) gets the highest percentage score of 22%. These achievements were produced through several waste management and processing programs through the Budi Luhur Waste Bank Program. Waste collection is monitored and checked regularly. This program has been carried out consistently and continuously since 2014. However, the Sewerage is still handled conventionally. Waste is channeled through special channels and collected in reservoir and infiltration wells. The handling of sewerage needs to be improved by utilizing appropriate technology to utilize septic tank waste as a renewable energy source. While

the lowest score is on the Water (WS) indicator which only gets a score of 12% of the total percentage of the maximum score of 45.00%. This is because there has been no implementation of the water recycling program and the lack of use of water-saving devices that are currently new with the installation of automatic faucets with sensors at the campus mosque ablution area. Automatic faucet installation can be installed on all existing water faucets.

The results of the 2020 UI GreenMetric assessment and ranking at Universitas Budi Luhur still show several aspects that need to be continuously improved. Among them are indicators of forest vegetation area, green open space to meet campus population oxygen, implementation of smart building systems, liquid waste management, and the use of water-saving devices which still get a fairly low score. Policies regarding the use of renewable energy for electricity and the implementation of smart buildings, so as to reduce waste of electrical energy and reduce electricity costs, need to be addressed properly. In addition, waste management management, such as the 3R program or Reuse, Reduce, and Recycle, continues to be implemented, and even needs to be improved in an integrated program between faculties.(Gandasari, Hotimah and Miyarsah, 2020).

CONCLUSION

From the results of research regarding the evaluation of the green campus concept at Universitas Budi Luhur based on the assessment of 6 categories of UI GreenMetric standards, the final points obtained were 5,850 points from the maximum point of 10,000 points in 2020. Of the 6 categories assessed, the score far from the maximum value was Setting and Infrastructure (SI) category, Energy and Climate Change (EC) category. Meanwhile, the lowest percentage value was in the Water (WR) category, which was 12%, especially on indicators of the implementation of water recycling and the use of water-saving equipment. Therefore, improvements in each indicator need to be carried out, such as adding open space and increasing facilities in it, increasing the area of land planted with forest plants, reducing areas that cannot be impregnated with water, increasing the implementation of renewable energy use, increasing the implementation of smart building systems, utilizing waste for electrical energy sources, Recycling water, and using tools to save water. In its development, Universitas Budi Luhur needs to establish special policies that can accommodate indicators of a sustainable campus or Green Campus in accordance with the UI GreenMetric, this is considered quite important so that all academics, both educators, education staff and students, can actively participate in running this program systematically, and sustainable.

REFERENCES

Abdurrahman (2003) 'Sustainable Development in the Management of Indonesia's Natural Resources', in National Law Development Seminar', in National Law Development SeminarVIII. Denpasar, Bali, pp. 1–12.

Association for the Advancement of Sustainability in Higher Education (2017) The Sustainability Tracking, Assessment & Rating System (STARS). Available at: https://stars.aashe.org/.

Chaerul, M. and Susangka, A. (2011) 'Selection of City Waste Composting Technology Using Analytic Hierarchy Process Approach', Journal Purifikasi, 11(2), pp. 71–78.

Fatmawati, S. and Syahbana, J. A. (2015) 'Implementation of Sustainable Development Policy in Campus Environment (Comparative Study Between Diponegoro University's Tembalang Campus and Nantes University's Tertre Campus)', Journal of Urban and Regional Development, 11(4), pp. 484–497. doi: DOI:10.14710/PWK.V11I4.17599.

Gandasari, I., Hotimah, O. and Miyarsah, M. (2020) 'Green Campus As a Concept in Creating Sustainable Campuses', KnE Social Sciences, 4((14)), pp. 1–9. doi: https://doi.org/10.18502/kss.v4i14.7853.

Gholami, H. et al. (2020) 'An ISM Approach for the Barrier Analysis inImplementing Green Campus Operations: TowardsHigher Education Sustainability', Sustainability, 12(363), pp. 1–20. doi: 10.3390/su12010363.

Hussin, R. and Kunjuraman, V. (2015) 'Exploring strategies for sustainable "ecocampus": The experience of Universiti Malaysia Sabah', Geografia-Malaysian Journal of Society and Space, 11(3), pp. 84–96. Available at: http://journalarticle.ukm.my/9227/1/9x.geografia-mac15-velan-edam1.pdf.

Lesmanawati, I. R. (2012) 'Syekh Nurjati Cirebon Environmental Baseline Analysis in Realizing a Green Campus Concept-Based Campus', Holistik, 13(1), pp. 75–94.

Mason, J. (2003) Sustainable Agriculture. Australia: Landlinks Press. Available at: https://books.google.co.id/books/about/Sustainable_Agriculture.html?id=8dg2Fx1uPSoC&redir_esc=y.

Mcmillin, J. and Dyball, R. (2009) 'Developing a whole-of-university approach to educating for sustainability', Journal of Education for Sustainable Development, 3(1), pp. 55–64. doi: 10.1177/0973408209.

Murtiyarini (2014) 'Sustainable Green Campus', http://murtiyarini.staff.ipb.ac.id/2014/06/11/sustainable-green-campus/. Available at: http://murtiyarini.staff.ipb.ac.id/2014/06/11/sustainable-green-campus/.

Tiyarattanachai, Ronnachai and Hollmann, N. M. (2016) 'Green Campus initiative and its impacts on quality of life of stakeholders in Green and Non-Green Campus universities', in SpringerPlus 5, pp. 1–84.

UI GreenMetric Ranking Team (2019) 'UI GreenMetric Guideline', in UI GreenMetric Guideline. Depok, West Java, pp. 1–34.

UI GreenMetric Team World University Rankings (2020) Certifikat as Most Sustainable University in 2020 UI GreenMetric World University Rankings.

Widiasih, W. and Nuha, H. (2019) 'Suggested Sustainable Lifestyle Strategy to Support Eco Campus at Abc University Surabaya', in National Symposium on Design and Industrial Application EngineeringXVIIII. Surakarta.

Wimala, M., Akmalah, E. and Rangga, S (2016) Green Campus Assessment Measuring Tool, PUPT Research Final Report not published. Bandung.