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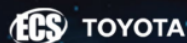View the article online for updates and enhancements.

Performance of Green Environmental Governance at State University of Surabaya, Indonesia

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Abstract. Sustainable development of the environment is one of the things that must be fulfilled, especially in the university environment, including at the State University of Surabaya. Through the eco-campus program, the State University of Surabaya (Unesa) participates in green environmental management that supports sustainable development. The purpose of this study was to describe the performance of green environmental governance at the State University of Surabaya. The research method uses a literature/library study approach. Data analysis methods with data minimization, data visualization, data analysis, data validation, and concluding. The results of the study stated that Unesa has six aspects that are of concern in the sustainability of environmental development: policies and infrastructure, energy and climate change, waste management, water management, transportation, and education. From the six aspects, Unesa has carried out activities that support energy saving and environmental awareness. The total final score for the assessment of the six aspects is 65.75% which is good but still needs to be improved to make it even better. In conclusion, Unesa already has activities and programs supporting sustainable development, but it still needs improvement to improve the environment.

1. Introduction

Environmental problems are the main problems of this century that must receive full attention. Scientists continue to warm to the notion that the Earth is entering (or has already entered) an epoch characterized by human-induced changes to Earth's surface condition, the "Anthropocene." On the other hand, more and more attention is being paid to the ecological consequences of uninterrupted population growth. Moreover, other consequences are associated with economic activities and human consumption patterns in an ever-industrializing world [1]. Ecological intelligence is humans' ability to adapt to the environment they are in to respond to various conditions around them [2]. Therefore, sensitivity, awareness, understanding, critical thinking, and environmental ethics are needed in the context of environmental competence [3]. Ecological intelligence is developed through education. Environmental awareness competence is needed to indicate students' awareness of a healthy environment [3]. Environmental problems require cooperation from all elements of society, including the academic

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communities as an academic who is expected to provide solutions or solutions related to environmental problems. A growing interest in environmental issues has led to a research stream dedicated to university sustainability [4]. In line with environmental problems that demand solutions and solutions, there are various movements, programs, and policies on dealing with environmental problems, including programs being developed by universities, namely green campuses or eco campuses.

In particular, the eco-campus represents an opportunity to guide the implementation of innovative environmental measures in areas such as public transit, heating, design, and construction [5]. The eco campus program believes the campus should be clean, shady, and healthy. As a result of the increasing awareness of sustainability and environmental concerns, universities are now a part of environmental sustainability not only through research but also through improving their campus infrastructure into a more environment-friendly setting, as well as updating their curricula to cover courses on the environment and sustainability [6]. As a campus that received an eco campus award from the Mayor of Surabaya in 2016, the State University of Surabaya (Unesa) continues to be committed to realizing a sustainable and comprehensive eco campus. The Unesa eco campus has programs already running to support the go green-based Unesa campus. Among them are establishing a waste bank, saving electricity and water, constructing a small reservoir in the Lidah Wetan campus area as a rainwater reservoir, and forming an eco-campus team and its divisions. Furthermore, to support the eco-campus program, Unesa also received assistance in the form of plants and trees from the Surabaya City Environment Agency [6].

Unesa's eco-campus program has seen how campuses can effectively and efficiently utilize available resources and infrastructure, such as managing transportation, using electricity, processing waste, and implementing lifestyles. Appropriate measurements and assessments are needed to maintain the sustainability of the eco-campus program at Unesa to find out what things need to be improved and improved. This study will describe the performance of green environmental governance at the State University of Surabaya, Indonesia.

2. Methods

This research used a literature or library study approach [7]. The data source will be collected from relevant information on the eco campus program at the State University of Surabaya through scientific books, journals, research reports, regulations, and encyclopedias, both printed and electronic. The data analysis method for this research is analytical at the time of data collection, capturing the essence of the research aims through the collected sources. Then re-analyze the collected data as raw data that need to be identified with each other. Analytical activities include data minimization, visualization, validation, and conclusion.

3. Results and Discussion

As a university that cares about sustainable development, Unesa has an eco-campus program with several aspects of concern. These aspects include (1) policies and infrastructure, (2) energy and climate change, (3) waste management, (4) water management, (5) transportation, and (6) education. This aspect measures the achievement index of sustainable development at Unesa. The results of the measurement of each aspect are listed in Table 1.

Unesa is still ranked 313 out of 956 universities in the world related to eco-green campuses as a commitment to overcome environmental problems and impacts [8]. Dari penilaian yang dilakukan oleh UI Green Matric, untuk kebijakan dan sarana prasarasna State University of Surabaya mencapai poin 875 yakni 58,33% dari maximum point 1500. Pada segi energi dan perubahan iklim, State University of Surabaya mencapai poin 1450, yakni 69.05% dari 2100. Pada segi waste management, State University of Surabaya mencapai poin 900, yakni 50% dari maximum point 1800. Pada segi water management, State University of Surabaya mencapai poin 800, yakni 80% dari maximum point 1000. Pada segi transportation, State University of Surabaya mencapai poin 1250, yakni 69.44% dari maximum point 1800. Pada segi education, State University of Surabaya mencapai poin 1300, yakni 72.22% dari

maximum point 1800. Sehingga State University of Surabaya secara keseluruhan mencapai poin 6575, yakni 65.75% dari maximum point 10000.

Table 1. Unesa's green environmental governance performance in 2021 [9]

Category	Point	% Achievements	MaximumPoint
Policy and Infrastructure	875	58.33%	1500
Energy and Climate Change	1450	69.05%	2100
Waste Management	900	50.00%	1800
Water Management	800	80.00%	1000
Transportation	1250	69.44%	1800
Education	1300	72.22%	1800
Total Score	6575	65.75%	10000

3.1. Policy and Infrastructure

Unesa campus management provides infrastructure that supports the implementation of the eco campus in the university environment. Facilities and infrastructure can be understood as all the supporting tools needed in carrying out a process and activity. Eco campus facilities and infrastructure provided by Unesa management include the availability of trash bins. The available trash cans are almost evenly distributed throughout the building and have been provided in 2 types, namely organic and inorganic waste bins. In addition to the availability of trash cans, Unesa's eco campus facilities can also be found in its green open space, which provides a gazebo for students to gather and relax while doing assignments or just discussing.

Eco campus infrastructure in Unesa includes green open fields, mango gardens, open gardens in each faculty, and a recreation park named the Independent Learning Laboratory at Unesa Lidah Wetan. Besides functioning as a green open space, the park also functions as a comfortable place for interaction and expression for faculty members. Even though it has provided facilities and infrastructure that support the implementation of the eco campus, the ideal achievement score index is still at 875 per 1500, or 58.33%. This can be seen based on findings in the field, which show that there are still things that need to be improved.

Figure 1. Unesa Lab Merdeka Belajar Facilities [10].

3.2. Energy and Climate Change

Climate change is driven by the dominant use of natural energy, such as fossils, which causes greenhouse gas emissions. Global warming and climate change's impact on various sectors naturally prove the exploration of unsynchronized development and un-environment-friendly resources [11]. Renewable energy and climate change are interrelated. Unesa has been committed to saving and using renewable energy, which is known to come from the sun, water, and wind.

Solar panels are one of Unesa's efforts to save energy in line with the existing climate change and require renewable energy. The use of solar panels in Unesa reaches 10% of the total energy used, both

in offices and for street lighting [12]. In addition, this figure was also achieved based on the campus response to climate change in terms of other things such as reforestation, water recycling, paperless policies, no plastic policies when shopping at university convenience stores, as well as policies on saving the use of Air Conditioners and LED lights in the campus environment. The index for measuring green environmental governance based on energy and climate change at Unesa reached 1450 out of 2100 points, or 69.05%. Even though it is more than 50%, there is still a need for improvement in the application of efficiency and energy, for example, by holding the implementation of equipment with procurement policies tailored to sustainable development goals.

Figure 2. Solar Panels in the Unesa Environment,
research documentation (2022)

3.3.   Waste Management

Waste management is a mandatory thing that universities must do to support sustainable development [13]. Unesa has innovatively managed organic waste into compost with the Unesa Compost House. The Unesa Compost House was established in 2011 and consistently processes organic waste consisting of leaves, food waste, and perishable grass using aerobic methods.

In addition to compost processing, Unesa's efforts and commitment to reducing the use of plastic and paper are carried out as follows: a). Enforce an E-office or paperless policy by utilizing the website and campus applications for several administrative arrangements; b). Collection of student assignments and reports in the form of soft files, c). Innovation to turn plastic waste into valuable items such as recycling banner waste into tiktokers bags with various functions.

The green environmental management measurement index based on waste management aspects at Unesa reached 900 out of 1800, or as much as 50%. This indicates that things still need to be improved, such as the paperless policy, which has not been implemented thoroughly at the faculty and department levels. Several files and document management still require direct interaction and hardcopy, mainly in document management administration.

3.4.   Water Management

Unesa also implements water conservation, water recycling, water efficiency programs, and drinking water production as part of a sustainable program related to water issues. Unesa supports a zero delta-Q policy for each drainage to reduce surface loss by providing several ponds equipped with door facilities and pump houses. This is necessary to maintain the surface and surface layer of the drainage system to optimize its function.

Water quality from existing ponds is maintained by keeping fish and regular water checks. The campus forest can objectively be seen as an effort to maintain green open space and is an infiltration area to increase the capacity of groundwater as an effort to conserve water within the campus area. This effort has conserved at least 50% to 75% of water.

Approximately 50% of the water within the University has been recycled and used to water plants in the forest area of the campus and around the campus. The recycled water is also used to water the sports field in the campus area. In terms of water efficiency, 50% of all buildings in Unesa have installed tools

for efficient water use, including tap water and flushing in toilets. In addition, Unesa's drinking water production is carried out by providing packaged drinks and gallons of water treatment in the campus environment. The Unesa water treatment index score was satisfactory at 80.00%.

Figure 3. Unesa Drinking Water Factory, research documentation (2022)

3.5. Transportation

Campus transportation is needed to support the high mobility of lecturers and students. Along with the high mobility, the campus transportation mode must be environmentally friendly to support the reduction of emissions from the gas produced. Some of the steps taken by Unesa in reducing gas emissions are as follows: a). Provide campus bicycle facilities near the parking area, b). Providing bus facilities with large capacity, c). Providing minibus facilities, d). Provides campus bus and minibus services equipped with bus schedules, and e). Providing integrated bus stops with two to four parking spaces with sidewalks [12].

The Unesa Lidah Wetan bus stop is also integrated with Trans Semanggi Suroboyo, which has the Unesa-ITS route so that it can be used by campus residents and the public who want to visit from or to Unesa. The green environmental governance measurement index based on the transportation aspect at Unesa is at 69.44%, 1250 out of 1800 points. There are still students who do not understand how to access and get transportation services at Unesa. Therefore there is still a need for more optimal socialization.

3.6. Education

Unesa is committed to supporting sustainable development in the realm of environmental governance. In terms of education, Unesa offers 62 courses with themes such as education, transportation, environment, buildings, and the natural environment. The courses are spread across nine faculties and include 1,278 courses students can take. Some courses are mandatory in specific courses. Courses that support sustainability can be accessed through http://siakadu.unesa.ac.id/prodi [12]. In the future, local wisdom of environmental management can be used as input into effective, efficient, fair, and effective forestry formulation policies to tackle deforestation [14]. In line with that, the character of caring for the environment at the University becomes an important thing to develop.

To support the sustainability of research and education, the funds dedicated to supporting sustainable research reached 18500.3 US Dollars. The average total scientific publications on environmental, economic, and social management from 2019 to 2021 is nine publications. The green environmental governance measurement index based on the education aspect at Unesa reached 1300 out of 1800, 72.22% [12].

4.   Conclusion

As a university that supports sustainable development programs in environmental management, Unesa has at least six aspects that require attention and are used as measurements of environmental governance, including: (1) policies and infrastructure; (2) energy and climate change; (3) waste management; (4) water management; (5) transportation; and (6) education. The total score in Unesa's green environmental governance performance measurement index in 2021 shows 65.75%, which Unesa already has activities

and programs supporting sustainable development. Even though it is at more than 50%, it is still necessary to improve environmental governance by providing more massive socialization to campus residents so that all parties can carry out their respective roles to realize sustainable development in the field of a better environment. Green environmental governance is still possible to continue to be researched. This study's limitation is examining green environmental governance, which only focuses on the State University of Surabaya. This paper opens opportunities to be continued, such as discussing the success of the campus eco concept nationally and internationally. In addition, it can also be developed by comparing success with relying on developing concepts.

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