Achievement of green campus indications based on assessment indicators on H-BAT program Universitas Negeri Semarang

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Abstract. Universitas Negeri Semarang (UNNES) has a spirit to become a Conservation and International Reputation University is realized through strategic missions. One of the conservation-oriented implementation programs is H-BAT (Green, Clean and Healthy) Program. In its implementation, there is a problem, namely the achievement of H-BAT Program has not been maximized during the last 3 years in assessment. The objectives of this research are: (1) to identify of the potential and character of environmental support in the work units; (2) to determine the achievement of the indication of a green campus based on the assessment indicators on H-BAT Program. This research was carried out in four stages: (1) Data collection; (2) Spatial data processing; (3) Non Spatial data processing; (4) Analysis (ecological, technical standards); The results achieved in June 2020 are as follows: FT got 87,50%, FE got 85,87%, FMIPA got 81,52%, BUHK got 79,49%, FIP got 73,91%, LP3 got 69,23%, LP2M got 63,46%, FIS got 60,33%, PPS got 57,07%, FIK got 56,52%, FH got 52,72%, FBS got 49,46%, TIK got 40,38%, BPB got 34,62%, Library got 30,13%, Archive got 17,31%. From these results, it can be seen that there is a lack of maximum achievement due to, among others, the lack of guidance and technical assistance in the management of the unit. So it is necessary to complete governance guidelines and technical assistance that are more intensive in unit governance to achieve the goals of UNNES as a green campus.

1. Introduction
Universitas Negeri Semarang (UNNES) is one of the universities in the world that cares about the environment. With a vision of "Being a conservation-oriented and internationally reputed university", UNNES continues to develop a conservation-based academic life. In 2019, UNNES was ranked 85th greenest university in the world and ranked 5th in Indonesia is proof of UNNES' seriousness to care about environmental sustainability (based on the UI Green metric). The vision of developing UNNES until 2040 is to realize UNNES as a University of Conservation and Reputations with International Insights. The spirit of UNNES to become a university with a conservation perspective and with international reputation is manifested through strategic missions. One of the implemented programs with a conservation perspective is H-BAT (Green, Clean and Healthy) Program. H-BAT program which was implemented in 2016 is a development program from the previous program, namely the Green Unit Award (GUA). This program was developed by the Conservation Development Unit (Bangvasi) as an annual program. The program targets are work units as UNNES as a green campus.
faculty and non-faculty work units. In 2019 for the first time H-BAT Program was held online. This competition between work units takes place twice a year, namely July and December. H-BAT program in 2019 has been integrated with several UI Green metric indicators so that the results contribute to the strengthening of UNNES as a Conservation Insight University [1].

The UI GreenMetric ranking provides opportunities for each university to conduct some actions in order to accumulate better results and therefore achieve a better ranking in next year’s evaluation. UI GreenMetric can be a framework and a standard guideline for constructing a green university, and therefore help universities to green their overall activities. The UI GreenMetric ranking was developed to provide a profile for and way of comparing the commitment of universities towards going green and promoting sustainable operations, with regard to all three important dimensions: research, educational and environmental [9]. The UI GreenMetric lays a good foundation to incorporate the principle of sustainability within the higher education institutions and to implement a technical tool to quantify the efforts made in this direction. However, the method should become more stable, transparent and objective [10]. In term of indicators of sustainable campus assessment, water conservation program is suggested to the highest important indicator [11].

Through H-BAT Program, it is hoped that it can achieve several goals, namely: (1) spurring every work unit to implement the UNNES vision with a conservation perspective; (2) increasing campus community awareness to care more about the environment; and (3) increasing supporting data for the UI-Green metric indicators with international reputation. The program, which has been running for 4 years, has received a positive response from work units as program participants. Each work unit strives to improve the quality of the environmental carrying capacity according to the established assessment indicators. For those who managed to win the competition, they will receive an award from the Rector of UNNES and announced in the university leadership forum. The winner of H-BAT Program has a good reputation in campus environmental management and is a great achievement for the leaders.

H-BAT program provides the opportunity for every UNNES Campus work unit to always increase its carrying capacity for the environment. Energy efficiency efforts, reducing run-offs, rainwater harvesting, adding green space and other efforts have had a positive impact on work units and their users in supporting performance. H-BAT program is also used as an evaluation tool for the achievement of the UNNES vision with an environmental perspective. The integration of H-BAT with UI-Green metric also provides the formulation team with the ability to obtain real data in accordance with the assessment data for each work unit which will be accumulated into UI-Green metric support data at the university level.

In its implementation, there are obstacles related to the assessment indicators and achievements that the work unit has as a participant. The obstacle is the absence of standard standards that must be met based on assessment indicators with adjustments to the location and character of the work unit. This is certainly felt that there is an imbalance between one work unit and another, due to differences in potential, so that the formulation of the problem that can be raised is “What is the potential and character of work units that are environmentally supportive? And how are the green campus indications achieved based on the assessment indicators in H-BAT Program?”

Based on the background and problem formulation, this research has specific objectives, namely:

- Identification of the potential and character of environmental support in the work units of H-BAT Program participants
- Knowing the achievement of green campus indications based on the assessment indicators in H-BAT Program

2. Conservation Campus

2.1. Definition of Conservation Campus

Conservation means preservation or protection [2]. Literally, conservation comes from English, namely conservation, which means preservation or protection. Meanwhile, according to environmental
science, conservation is: (1) Efficient efforts from energy use, production, transmission, or distribution which result in reduced energy consumption, on the other hand, providing services of the same level; (2) Efforts to protect and prudently manage the environment and natural resources; (3) Management of a certain quantity which is stable during chemical reactions or physical transformations; (4) Asylum and long-term protection of the environment; and (5) A belief that the natural habitat of an area can be managed, while the genetic diversity of species can take place by maintaining its natural environment.

2.2. Conservation Concept
The manifestation of conservation program has several reasons that should become the basis and guide for conserving natural resources and the environment are: (1) Every living thing or species has the right to exist regardless of the number or importance to humans, each species must be guaranteed its sustainability; (2) All species depend on each other; (3) Humans have a mandate as "protectors and guardians of the earth"; 4) Respecting human life and paying attention to the interests of mankind are in harmony with respecting biodiversity; (5) Nature has a spiritual and aesthetic value that exceeds its economic value; (6) Biodiversity is needed to understand the origin of life; and (7) Improving environmental, aesthetic, cultural and religious quality is more important than increasing materialistic consumption [3, 4].

Taking into account the aforementioned matters relating to conservation and the existence of sustainable development, higher education institutions must be able to provide real examples in terms of how to protect, preserve and conserve biodiversity through education, research, and community service programs in the campus environment and its surroundings. in a large program themed "Conservation Campus". Thus the notion of a conservation campus is a tertiary institution that pays attention to the ecological conditions of the environment by protecting, preserving and conserving biodiversity through education, research, and service programs. This big program is the responsibility of campus stakeholders for the sustainability of biological life.

3. Development of Green Architecture Concept for Green Campus

3.1. Definition of Green Architecture
The definition of green architecture is an architectural environmental awareness that not only includes the main aspects of architecture (strong, functional, comfortable, low cost, aesthetics), but also includes the environmental aspects of a green building, namely energy efficiency, the concept of sustainability and a sustainable approach holistic towards the environment [4]. Green architecture concept is a design concept to produce a built environment (green building) which is built and runs sustainably or sustainably.

What is meant by green architecture is architecture that is environmentally sound and based on concern for the conservation of the natural global environment with an emphasis on energy efficiency (energy-efficient), sustainable patterns (sustainable) and a holistic approach (holistic approach) [5]. Starting from ecological design thinking that emphasizes interdependencies and interconnectedness between all systems (artificial and natural) with their local environment and biosphere. Credo form follows energy is extended to form follows environment which is based on reduce, reuse and recycle principles.

3.2. Facility planning and master plan on the Green Campus
In planning a green campus, the criteria for developing Energy and environmental designs for green buildings, especially for campus, include: (1) Site sustainability (the carrying capacity of the land and environment where the buildings are located); (2) Water efficiency (level of water efficiency); (3) Energy and atmosphere (energy and building atmosphere); (4) Materials and resources (use of existing materials and resources); (5) Indoor air quality (level of air quality in buildings); and (6) Keep options open (open to various things that are considered to provide opportunities) [6].
Activities within the scope of green campus planning include: (1) Site development (land development); (2) Utility resources conservation (conservation of utility resources); (3) Recycling and waste reduction (recycling and reduction of waste); (4) and Building occupant health, safety, and comfort (building a healthy, safe and comfortable residence).

3.3. Green Construction and Standard Operations

Several things are being done to build a sustainable campus at Frederick Community College that can be taken as a reference, namely: (1) Land development; (2) Water conservation; (3) Energy conservation; (4) Waste reduction and recycling; (5) Environmental quality in space.

4. H-BAT Program

H-BAT program is a green campus assessment program aimed at work units in UNNES Campus Environment. This program was held for the first time in 2017 and is a new form of the previous program called the Green Unit Award (GUA). In 2019 for the first time H-BAT Program was held online. This competition between work units takes place twice a year, namely July and December. In 2019, H-BAT program has been integrated with several UI Green metric indicators. In the UI Green metric integrated H-BAT Program, the assessment indicators are divided into 4 aspects, namely: (1) Green; (2) Clean; (3) Healthy; (4) UI-Green metric supporters and (5) Covid-19 (effective from June 2020).

H-BAT Program participants are work units within UNNES, both faculty and non-faculty groups. Faculty groups (30 indicators) include: Faculty of Education (FIP), Faculty of Language and Art (FBS), Faculty of Social Sciences (FIS), Faculty of Mathematics and Natural Sciences (FMIPA), Faculty of Engineering (FT), Faculty of Sports Science (FIK), Faculty of Economics (FE), Faculty of Law (FH), Postgraduate Program (PPS). Non-Faculty groups (22 indicators) include: General Bureau, Law and Personnel (BUHK), Institute for Research and Community Service (LPPM), Educational and Professional Development Institute (LP3), Business Development Agency (BPB), Library, TIU of Information Technology and Communications (TIK) and Archive Affairs.

Figure 1. Distribution of UNNES Campus Buildings in Sekaran, Semarang

5. Methods

This research used exploratory methods used in collecting and analyzing data. Exploratory research aims to explore and understand information and facts about the phenomenon under study and become the center of attention because little is known about it [8]. The exploratory method is carried out based on specific facts, then mapping and categorization are carried out. This method is also supported by field research to strengthen the analysis. In this research, the exploratory method is intended to see the development of the spatial structure of the research area by identifying spatial use from an ecological
perspective. The research material is work units within UNNES as a Participant in H-BAT Program. H-BAT is a work unit within UNNES, both faculty and non-faculty groups, namely: (1) Faculty groups: FIP, FBS, FIS, FMIPA, FT, FIK, FE, FH and PPS; (2) Non-Faculty Groups: BUHK, LPPM, LP3, BPB, Library, ITC, Archive Affairs.

This research was carried out in the following stages:

- Data collection, including primary (field survey) and secondary data (upload documents via web http://konservasi.unnes.ac.id/hbat)
- Spatial data processing
  - Processing data from field surveys
- Non spatial data processing
  - Processing data from documents that are included in H-BAT Program assessment indicators (via web http://konservasi.unnes.ac.id/hbat)
- Analysis
  - This stage focuses on the level of achievement of the work unit in H-BAT Program targets.
- Results
  - This stage is the analysis result formulation that becomes the basis for evaluating H-BAT Program in the June 2020 Period.

6. Results

6.1. Assessment Aspects

In H-BAT Program, the assessment indicators are divided into 4 aspects, namely: (1) Green; (2) Clean; (3) Healthy; (4) Supporting UI-Green metric and (5) Covid-19. The green aspect is related to the existence of biodiversity, especially flower plants and trees. Clean Aspects are related to building management that is clean and free of waste. Healthy Aspects relate to the provision of facilities and activities that meet health standards and the minimum risk of disease. UI Green metric aspect is related to the fulfillment of UI Green metric form as one of the competed standards for green campuses in Indonesia. Covid-19 aspect is related to the work unit's efforts in fulfilling the Covid-19 transmission prevention health protocol. The following are details of the assessment aspects:

- **Green**
  - Availability of Green Open Space
  - Maintenance of Green Open Space
  - The average number of living plants per building
  - Average number of art ornaments
  - Average marker in the building
  - The number of trees with a diameter of 10 - 25cm
  - Number of trees> 25cm in diameter
  - Percentage of trees marked with scientific and regional names
  - The area of the Vertical Garden

- **Clean**
  - Sanitary conditions of toilets and kitchens
  - The sanitary condition of the drainage network (sewer)
  - Cleanliness of office space
  - Cleanliness of the lecture hall
  - Availability of trash bins in the building
  - Percent availability of large bins outside the building

- **Healthy**
  - Sports activities
  - Percentage of space prioritizing natural ventilation
  - Percentage of space that prioritizes natural lighting
  - Availability of bicycles
- Availability of electric vehicles owned for operational activities
- Lactation room availability

- UI Greenmetric
  - Availability of a rainwater harvesting program
  - Number of recharge wells
  - The number of biopores
  - Number of tap water installations ready to drink
  - Number of drinking water refill points for public / students
  - Number of automatic taps with sensors
  - Number of double flush toilets
  - Activity budget that supports conservation
  - Percent of work unit budget allocated for research and community service that has conservation content and originates from PNBP funds
  - Research grants and conservation content service
  - Number of units producing renewable energy (solar panels, microhydro, biomass, wind turbine, bio gass)
  - The capacity of electrical energy generated from renewable energy (kWh) in one year
  - Courses that contain conservation
  - Publication of research and devoted loading conservation
  - Number of organized events related to conservation
  - Student organizations with conservation content activities
  - Conservation content on websites
  - Percentage of students planting 2020 uploaded at Siomon

- Covid-19
  - Percentage of outside hand washing facilities in each building
  - Percentage of hand sanitizers per building
  - Availability of pandemic health protocol posters / advisors
  - Implementation of the new normal protocol activities
  - Number of types of facilities distributed to employees for Covid-19 prevention

6.2. Assessment Stage
Assessment is the process of determining the ranking of work units of H-BAT Program participants that have reached the highest score. In the assessment process, it involved 3 components, namely: (1) UPT Bangvasi, as the driving force for H-BAT Program; (2) the jury, someone assigned by the UPT Bangvasi to assess; (3) Work units participating in H-BAT program. The following are the assessment steps for the June 2020 Period:
Figure 1 above explains the steps for the assessment: (1) UPT Bangvasi prepares an online Assessment Indicator Entry Form; (2) The work unit uploads data and supporting documents to the online assessment system; (3) The jury downloads the completed form and is assessed by the system; (4) All forms are recapitulated by UPT Bangvasi; (5) UPT Bangvasi appoints judges to conduct field visits in the context of verifying uploaded data; (6) The judges recap the data from the field visit; (7) The judges then carry out the analysis and determine the score; (8) The judges’ scores are brought to the plenary meeting at the UPT Bangvasi for ranking; (9) Determination of the winner based on the ranking results. But now, considering that every campus activity must implement the Covid-19 transmission prevention protocol, the assessment does not carry out field visits. Assessment refers to upload data and the updating of supporting documents.

The online assessment system became the media for uploading H-BAT data for all participant work units, including uploading supporting documents. The work unit accesses the online assessment system via the https://konservasi.unnes.ac.id/hbat and login according to the user name and password that has been informed by UPT Bangvasi. The jury as an assessor also did the same.
H-BAT online assessment system page for jury and downloadable evidence (supporting documents)

Figure 3. Page interface of H-BAT Online Assessment System

6.3. Assessment Results
H-BAT data uploaded by all participant work units will be automatically assessed by the online system. This assessment score is temporary and is not yet valid. Furthermore, all supporting data and documents will be verified and analyzed by the jury. The result of verification and analysis is the score of the jury which is determined as valid. In the calculation of the assessment, each indicator is assessed with score of 0 - 4, where each score has a description of the achievement from lowest to highest. The maximum achievement scores are 184 (for faculty and postgraduate) and 156 (for non-faculty), with a maximum score calculation of 4 multiplied by the number of filling indicators as many as 46 items for faculty / PPS and 39 items for non-faculty. Here are the results of the assessment:

| Work Unit | Green | Clean | Healthy | UI Greemmetric Support | Covid - 19 | Total Score | Achievements | Group |
|-----------|-------|-------|---------|------------------------|------------|-------------|--------------|-------|
| FT        | 32    | 24    | 18      | 67                     | 20         | 161         | 87.50%       | A     |
| FE        | 33    | 23    | 16      | 66                     | 20         | 158         | 85.87%       | A     |
| FMIPA     | 33    | 23    | 18      | 58                     | 18         | 150         | 81.52%       | A     |
| BUHK*     | 30    | 20    | 20      | 34                     | 20         | 124         | 79.49%       | A     |
| FIP       | 26    | 21    | 18      | 51                     | 20         | 136         | 73.91%       | A     |
| LP3*      | 33    | 20    | 17      | 18                     | 20         | 108         | 69.23%       | B     |
| LP2M*     | 26    | 13    | 8       | 33                     | 19         | 99          | 63.46%       | B     |
| FIS       | 24    | 22    | 16      | 29                     | 20         | 111         | 60.33%       | B     |
| PPS       | 23    | 20    | 10      | 34                     | 18         | 105         | 57.07%       | B     |
| FIK       | 21    | 20    | 17      | 26                     | 20         | 104         | 56.52%       | B     |
| FH        | 26    | 20    | 10      | 23                     | 18         | 97          | 52.72%       | B     |
| FBS       | 20    | 20    | 13      | 21                     | 17         | 91          | 49.46%       | C     |
| ITC*      | 9     | 20    | 5       | 11                     | 18         | 63          | 40.38%       | C     |
| BPB*      | 11    | 11    | 9       | 10                     | 13         | 54          | 34.62%       | C     |
| Library*  | 11    | 14    | 6       | 9                      | 7          | 47          | 30.13%       | C     |
| Archive   | 5     | 5     | 6       | 2                      | 9          | 27          | 17.31%       | C     |
From the results of the assessment, then the ranking is carried out. From the results of the ranking, there were 3 groups of achievements, namely: (1) Group A (achievements> 70%, as many as 5 work units); (2) Group B (achievements 50% -70%, as many as 6 work units); and (3) Group C (achievements <50%, as many as 5 work units). The scores of each work unit in the achievement group are sorted according to ranking based on the achievements of each work unit.

Based on the achievement table above, it can be seen in more detail the achievements of each aspect of H-BAT Program according to the following table 2.

Table 2. Achievements on H-BAT aspects

| No | Work Unit | Green | Clean | Healthy | UI Greenmetric Support | Covid -19 |
|----|-----------|-------|-------|---------|------------------------|-----------|
| 1  | FT        | 32    | 89%   | 100%    | 18                     | 75%       | 67        | 84%   | 20 | 100% |
| 2  | FE        | 33    | 92%   | 96%     | 16                     | 67%       | 66        | 83%   | 20 | 100% |
| 3  | FMIPA     | 33    | 92%   | 96%     | 18                     | 75%       | 58        | 73%   | 18 | 90%  |
| 4  | BUHK      | 30    | 83%   | 100%    | 20                     | 83%       | 34        | 61%   | 20 | 100% |
| 5  | FIP       | 26    | 72%   | 88%     | 18                     | 75%       | 51        | 64%   | 20 | 100% |
| 6  | LP3       | 33    | 92%   | 100%    | 17                     | 71%       | 18        | 32%   | 20 | 100% |
| 7  | LP2M      | 26    | 72%   | 65%     | 8                      | 33%       | 33        | 41%   | 19 | 95%  |
| 8  | FIS       | 24    | 67%   | 92%     | 16                     | 67%       | 29        | 36%   | 20 | 100% |
| 9  | PPS       | 23    | 64%   | 83%     | 10                     | 42%       | 34        | 43%   | 18 | 90%  |
| 10 | FIK       | 21    | 58%   | 83%     | 17                     | 71%       | 26        | 33%   | 20 | 100% |
| 11 | FH        | 26    | 72%   | 83%     | 10                     | 42%       | 23        | 29%   | 18 | 90%  |
| 12 | FBS       | 20    | 56%   | 83%     | 13                     | 54%       | 21        | 26%   | 17 | 85%  |
| 13 | ITC       | 9     | 25%   | 100%    | 5                      | 21%       | 11        | 20%   | 18 | 90%  |
| 14 | BPB       | 11    | 31%   | 55%     | 9                      | 38%       | 10        | 18%   | 13 | 65%  |
| 15 | Library   | 11    | 31%   | 70%     | 6                      | 25%       | 9         | 11%   | 7  | 35%  |
| 16 | Archive   | 5     | 14%   | 25%     | 6                      | 25%       | 4         | 4%    | 9  | 45%  |

Source: Data processing, 2020

6.4. Analysis
The achievement of Group A, namely the 5 work units with the highest scores, showed good quality in green work unit governance. However, seen as a whole, several work units have shown good results even though they are outside Group A. The results of the work units' achievements in H-BAT Program assessment aspect show a very large range of achievements. In Green aspect, the highest achievement was 92% (FE, FMIPA, LP3) and the lowest was 14% (Archive Affairs). In Clean aspect, the highest achievement was 100% (FT, BUHK, LP3, UPT-TIK) and the lowest was 25% (Archive Affairs). In Healthy aspect, the highest achievement was 83% (BUHK) and the lowest was 21% (ITC). In UI Greenmetric supporting aspect, the highest achievement was 84% (FT) and the lowest was 4% (UPT Kersipan). In the Covid-19 aspect, the highest achievement was 100% (FT, FE, BUHK, FIP, LP3, FIS, FIK) and the lowest was 35% (Library).
From the input data and supporting documents available, it can be seen that in general the influencing factors related to resources and governance are as follows:

- Achievement of more than 70%: work units have sufficient resources, good infrastructure support, optimal development and management.
- Achievement of 50% -70%: work units have sufficient resources, infrastructure support is still not good, development and management are not optimal.
- Achievement of less than 50% work units do not have sufficient resources, infrastructure support is still not good, development and management are still low.

In addition to the resource and governance factors, achievements are also related to the following:

- Common understanding that green work units are an important part of the formation of UNNES as a green campus
- Readiness of work units in uploading form data and required supporting documents
- Complete documentation (photos, videos) and archives of each program / activity carried out by the work unit
- Systematic documentation and archive management with online / offline media support
- Sustainability of policies that continue to support conservation programs at UNNES
- Involvement of all stakeholders in supporting H-BAT Program, both from the management element and technical elements
- Stakeholder understanding of the content indicators as a target for the development of a green campus at UNNES
- Availability of standard standards that become references for each work unit in following up H-BAT Program

7. Conclusion

H-BAT Program developed by UPT Bangvasi is not only a competition program for ranking the greenest work unit in UNNES. However, it has a broader purpose in order to strengthen UNNES as a green campus, which is supported by all work units in it. H-BAT Program as one of the implementation programs for green campus development, is a benchmark for work unit performance to be even better in carrying out conservation-based governance as a form of a sustainable green campus.

Overall of the 16 work units that participated in H-BAT Program for the June 2020 Period, only 5 work units achieved the target of above 70%. Even 5 other work units only reached the target of less than 50%. This is certainly not in line with the expectations of H-BAT Program which has been running for the last 4 years, even before that there was a similar Green Unit Award Program.

In order to increase the achievement of targets in H-BAT Program, the work unit needs to immediately improve by evaluating the results of the current H-BAT Program. Furthermore, the work unit tries to formulate strategic steps to increase the achievement in each aspect. Each work unit should have a task force, in which several faculties have what is called Conservation Group. However, involvement in overseeing H-BAT Program in each work unit is less than optimal, including when uploading data and supporting documents. Going forward, synergy between stakeholders involved at the work unit level needs to be strengthened. In addition, UPT Bangvasi as program manager needs efforts to complete management guidelines and more intensive technical assistance in work unit governance to achieve UNNES goals as a green campus with an environmental perspective.

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