Preface

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PREFACE

The 3rd International Symposium on Transport Studies in Developing Countries (ISTSDC) is a biannual international symposium hosted by Universitas Indonesia and Universitas Pembangunan Jaya. This year's edition was held on 5 November 2021 and raised "The Role of Transportation in Civilization and Sustainable Environment" as the theme. Due to unforeseen circumstances, the 3rd ISTSDC was held through a virtual meeting considering the COVID 19 pandemic. Additionally, the 1st and 2nd ISTSDC symposiums were held at Makassar and Kendari.

The 3rd ISTDC aims to outline the development of transport science in developing countries through various topics such as Intelligent Transport System, Land use and Transport Interaction (LUTI), sustainable transport, traffic safety and engineering, public transport, pavement design, and highway engineering. Furthermore, ISTSDC also aims to be the media for research, practice, industry, and government to discuss and share breakthrough ideas to solve the transport-related problem in developing countries.

This year, the ISTSDC organizing committee invited three Keynote Speakers, namely Prof. Ronghui Liu from the University of Leeds, Prof. Hanaoka Shinya from Tokyo Institute of Technology, and Prof. Sutanto Soehodho from Universitas Indonesia, to share their knowledge and experience about the current issues related with the transportation system in the world. The international symposium, attended by numerous speakers, successfully provided ideas about the world of transportation and various disciplines related to it. The selected papers are published in this volume of the IOP Conference Series: Earth and Environment Science.

As the closing statement, we want to deliver our gratitude to all sponsors who supported this event, including Universitas Indonesia, Pembangunan Jaya University, Bentley Systems, Inc., PT. Jasamarga, Tbk., and PT. Kereta Cepat Indonesia-China (High-Speed Railway Consortium). To all the speakers and participants who contributed to the discussions, it was our pleasure to hold a symposium with exceptional papers despite being presented through the online meeting. Finally, we would like to appreciate our local organizing committee, who made this symposium possible, including the FSTPT Scientific Committee, who supported the review process to ensure the scientific quality of the selected manuscript.

Looking forward to seeing you again at the 4th ISTSDC, hopefully, we can meet in person in the future very soon!

Ir. Tri Tjahjono, M.Sc., Ph.D.
(Chief of Symposium Local Committee)

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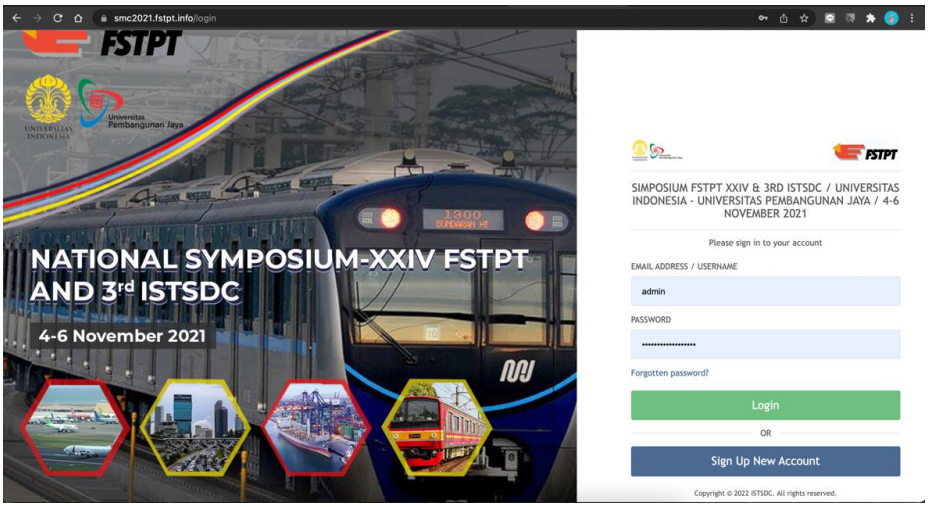

- Number of submissions received: **44 papers**
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Evaluation of the Green Transportation Concept in the Sultan Ageng Tirtayasa University Campus

Evaluation of the Green Transportation Concept in the Sultan Ageng Tirtayasa University Campus

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Abstract. A green campus is an environmentally friendly concept that promotes the creation and the use of transportation means with minimal effects on people and the environment. Notably, the green campus program is adapted to create awareness in the campus community to make the environment habitable. This research used UI GreenMetric World University Rankings with 8 green transportation criteria to conduct the assessment. Based on the observation and analysis, a total of 1475 from a maximum value of 1800 was obtained. This was 81.9%, which means that green transportation at Sultan Ageng Tirtayasa University is progressing. However, several improvements need to be made, including special policies to restrict vehicles from entering the campus, developing emission-free transportation, and making an integrated parking building.

1. Introduction

The academic community has the mandate to keep the campus environment free from greenhouse gas (GHG) emissions in an effort to use the resources and technology effectively (1). Applying a green campus can create a healthy environment and build awareness, especially regarding the importance of the environment, which decreases operational costs [2, 3]. The Indonesian government strives to reduce the impact of global warming using various organizations, including the academic community [4]. In 2013, five pilot campuses were set for the green campus program to reduce global warming [5]. The campuses were tasked to play an active role in addressing sustainability issues in energy management and human data sources in their functions, including teaching, research, partnerships, and services such as helping communities to live sustainably [6].

Increased greenhouse gas emissions (GHG) do not only concern Indonesia but the world at large. The research conducted by the environment ministry indicated that one of the sources of GHG emissions is from the transportation sector. Therefore, strategies are in place to minimize GHG in the transportation sector to 26% - 41% [7]. To achieve the set target, the IPB campus developed the concept of green transportation to encourage people to use environmentally friendly public transport [8]. The key idea in this concept was to minimize the use of motorized vehicles by providing public transportation facilities with low emission levels besides promoting a walking culture [9].

Several methods can be used to evaluate green campus indicators, including UNEP (United Nation Environmental Program), Ministry of Environment and Forestry (Green Public Facilities), Green Building Council, and UI GreenMetric. Both international and domestic, Campuses use the UI GreenMetric standard rating system to assess environmental management [10, 11]. The research conducted at the Semarang State University regarding the development of green transportation found that the available infrastructure was not optimal. Consequently, the high pollution within the campus affected the comfort of the academic community [12].

Sultan Ageng Tirtayasa University (UNTIRTA) is also among the campuses implementing a green campus program with a UI GreenMetric. In 2020, the university was ranked 30th at the national level with regard to the implementation of the green campus program. It is hoped that the program will minimize the current environmental problems. Therefore, this research aimed to evaluate the green transportation system at the UNTIRTA campus to increase the UI GreenMetric ranking in the coming years.

2. Methodology

In this research, a qualitative approach was used through direct observations of the criteria for green transportation at UNTIRTA. Also, quantitative approach to make comparisons by assessing the green campus using the UI Green Metric World University Ranking [13]. In 2019, at least 780 universities from 85 countries across the globe participated in the UI GreenMetric assessment with a focus on sustainable green campuses [14].

There are six Green transportation assessment categories and indicators for UI GreenMetric, including the ratio of the vehicles divided by the total population in the campus, shuttle services within the campus, policies regarding emission-free vehicles on campus, the ratio of the number of emission-free vehicles divided by the total population in the campus, the ratio of the parking area to the total area, campus transportation programs designed to limit or reduce parking areas on campus over the past 3 years, and the number of transportation initiatives to reduce private vehicles on campus. Each indicator is presented in the percentage form and divided into 5 levels ranging from the lowest to the highest. Each criterion was categorized as general until the results were processed, and the gross value multiplied by the score's weight to obtain the final figure [13].

3. Analysis and Discussion

Vehicle pollution at the UNTIRTA campus has risen to worrying levels necessitating the implementation of a green campus. The analysis of the assessment on each indicator is as follows:

3.1. The ratio of the number of vehicles divided by the total campus population

This indicator reviewed the ratio of vehicles, both cars and motorcycles, divided by the campus population. The data required for this indicator includes the volume of vehicles with a total of 4905 vehicles. The total population at the UNTIRTA campus is 17664, and the vehicle ratio is 0.51 with a maximum value of 200, thus the score is being (0.5 x 200 = 100).

3.2. Campus Shuttle Service

The shuttle services are used to ease the transportation of passengers from one point to another within the campus. Additionally, specific shuttles ferry the members of staff within the campus while others take the staff to and from Serang, Cilegon, and UNTIRTA's Sindangsari campus, as shown in Figure 3. The assessment criteria looked at the availability of shuttle services provided by the campus with a specified schedule. Notably, the university contributed part of the financing to provide a maximum score of 300, therefore, the score: 0.75 x 300 = 225.

The UNTIRTA campus provides free bus services to support the academic community in accessing various destinations. The bus service operation schedule, divided into B.01 and B.02, runs from Monday to Friday, with Sindangsari being the central bus stop. Route B.01 goes through the New UNTIRTA Sindangsari Campus – Campus D Nursing - Campus B, and Faculty of Engineering Cilegon. Route B.02 serves the New UNTIRTA Sindangsari Campus - Campus C FKIP Ciwaru – Campus A UNTIRTA in Pakupatan. In a bid to reduce the use of private cars with the main campus in Sindangsari, there are plans to have buses operating within to serve the entire academic community.

Figure 1. Shuttle Bus and Elf Sultan Ageng Tirtayasa University

3.3. Policy regarding emission-free vehicles on campus

The UNTIRTA has provided free bicycle services to create a pollution-free environment within the campus. The university should continually support this initiative by providing the required infrastructure to encourage the daily use of bicycles as a means of transportation. This will increase the safety of all road users besides helping to reduce the use of vehicles, which are the major pollutants. Figure 2 below presents bicycle users within the campus.

Figure 2. Emission Free Vehicles Sultan Ageng Tirtayasa University

Therefore, bicycle service as an alternative in facilitating the movement of the UNTIRTA academic community to move from one building to another one to avoid vehicle emissions on campus. Also, the availability of campus bicycle services can improve the quality of the environment and the safety of road users on the UNTIRTA campus by starting to reduce the use of motorized vehicles in the campus environment.

3.4. The ratio of Total Parking Area to Total Campus Area

The parking area ratio is calculated by dividing the total campus area covered by the parking space. This calculation is required to determine the percentage of the total parking area on campus as presented in Table 1, which shows a total campus area of 356193 m^2 compared to the parking space of 5127.83 m^2. The percentage of the parking area to the total campus area is 1.44% and belongs to the category < 4 – 1%.

Table 1. Total area and parking area of UNTIRTA Campus

No	Campus	Area (m^2)	Parking Area (m^2)
1	Pakupatan Campus	28.384, 0	3.015, 8
2	Sindangsari Integrated Campus	230.975, 0	3.226,23
3	Cilegon Campus / Faculty of Engineering	61.685, 0	1.546, 85
4	Ciwaru Campus	29.216, 0	574,6
5	Kepandean Campus	5.050,550	1327, 0
	Total Area	356.193, 0	5127,83

3.5. A transportation program designed to limit or reduce the parking area on campus over the past three years (from 2016 to 2018)

Enacting policies regarding entrance and parking within campus premises will help to preserve the environment. Also, some campuses have limited space for parking, in particular, A Pakupatan UNTIRTA. As a result, policies were put in place to ensure only vehicles with stickers park within the campus. Consequently, only vehicles belonging to the University (Dinas), Senior Lecturers (Sepuh), Education Personnel have access to the parking lots within the campus. Additionally, third parties to provide alternative parking areas to the motorists who miss parking within the campus. Furthermore, the University has drafted several additional policies to limit the number of vehicles parking within the campus, especially at the New Sindangsari. The drafting of the new regulations was based on the Rector's Decree No. 637 / UN43 / KPT.PR.00.00 / 2020. The new policies include:

- The application of vehicle parking fees in the UNTIRTA campus
- Enforcement of vehicle plate odd-even system for all vehicles entering the campus, except for official vehicles
- Enactment of the operation of buses serving inter-campus routes that operate from 0700 - 1800 Hrs
- Enforcement of Car Free Day (CFD) at the UNTIRTA, where no car is allowed at least once a week
- Prohibition in bringing vehicles into the campus for one year for the first-semester students

3.6. Sultan Ageng Tirtayasa University's policy is to limit or reduce the number of private vehicles on campus

The Car Free Day is a routine plan by UNTIRTA to support and care for the environment as stipulated in Rector's Decrees and Rector's Letters. By implementing the CFD activity, the campus is protected from vehicle emissions that pose a danger to people and the environment. The policy of the CFD program can create a new culture in transportation, using public transportation, cycling, and walking, which can be seen in Figure 3.

Figure 3. Conditions of Car Free Day Implementation at UNTIRTA

As UNTIRTA's main commitment to realize a green campus, plans are underway to build an integrated public transport service system. A ticketing system with low rates is set to be put in place and provided at no cost in some situations. To support this service, UNTIRTA will implement restrictions on the SRP (Parking Space Unit) as an effort to force motorized users to switch to public transportation. Also, UNTIRTA has provided free campus bus services to each UNTIRTA campus from Monday to Friday.

3.7. Pedestrian Paths

Sidewalks in the UNTIRTA campus are intended to make it easier for pedestrians to comfortably and safely reach their destinations. In this regard, the pathways have shelters to protect pedestrians from heat and rain besides being constructed from the main roads to ensure pedestrian safety. Additionally, there are guide blocks for pedestrians with physical disabilities, as seen in Figure 4.

Figure 4. Pedestrian Paths Implementation at UNTIRTA

3.8. Total of UNTIRTA Green Campus Assessment

The green campus assessment for UNTIRTA is shown in Table 2. Based on the results, UNTIRTA's assessment of UI Greenmetric found that TR1 is weakest due to the absence of vehicle restrictions entering the campus. Furthermore, long-term campus policies should be put in place.

Table 2. Transportations Category and Indicator

No	Category and Indicator	Maximum	Assessment
TR 1	The ratio of the number of vehicles divided by the total population	200	100
TR 2	Campus shuttle service	300	225
TR 3	Policies regarding emission-free vehicles on campus	200	200
TR 4	The ratio of the number of emission-free vehicles divided by the total campus population	200	150
TR 5	The ratio of the parking area to the total campus area	200	150
TR 6	Transportation program designed to limit reducing parking areas on campus over the past 3 years (from 2016 to 2018)	200	150
TR 7	Number of transportation initiatives to reduce private vehicles on campus	200	200
TR 8	Pedestrian policy on campus	300	300
TOTAL		1800	1475

While the total value of green transportation is 81.9% out of the UI GreenMetric maximum value, it is necessary to implement alternative strategies to maintain green transportation. The alternative strategies include drafting policies to encourage green transportation themed activities, such as using emission-free vehicles provided by the campus, coming up with specific plans, monitoring, reporting, evaluating, and creating a special team to ensure sustainability in the green campus program.

4. Conclusion

The green transportation analysis at Sultan Ageng Tirtayasa University based on UI GreenMetric scored 81.9% of the maximum value, which indicates great efforts to keep the environment free from pollutants. However, it is necessary to improve each criterion by checking the ratio of vehicles to the total population and using emission-free vehicles. Furthermore, there is a need for special policy planning to improve the criteria for Green Campus by UI GreenMetric. This will be achieved by restricting the number of vehicles entering the campus, developing emission-free transportation, and making integrated parking buildings. All these require the support and cooperation from all stakeholders to participate in the green transportation program actively.

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