Efficient Vol 4 (3) (2021): 1361-1375 DOI: https://doi.org/10.15294/efficient.v4i3.45228

EFFICIENT

Indonesian Journal of Development Economics

https://journal.unnes.ac.id/sju/index.php/efficient

Implementation of Sustainable Transportation at Higher Institutions

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Permalink/DOI: https://doi.org/10.15294/efficient.v4i3.45228

Received: June 2021 ; Accepted: September 2021 ; Published: December 2021

Abstract

Universities have an important role in realizing sustainable development. Semarang State University and Diponegoro University are two universities in Semarang city committed to implementing sustainable development in the campus environment. This study aims to analyze the implementation of sustainable transportation at Semarang State University and Diponegoro University. This research is descriptive quantitative. Respondents took part in this study using snowball sampling techniques consisting of pedestrian paths, bike lanes, campus bus/public transportation, and parking lots at Semarang State University and Diponegoro University. Social, economic, and environmental variables become variables that are analyzed using gap analysis and scoring methods to measure the criteria for sustainable transportation implementation. The results showed that implementing sustainable transportation at Semarang State University and Diponegoro University gained a perception of 37.5%. This means that the implementation of sustainable transportation has not been optimal.

Keywords: ***Sustainable transportation, pedestrian, parking lots, snowball sampling***

Abstrak

Perguruan tinggi memiliki peran penting dalam mewujudkan pembangunan yang berkelanjutan. Universitas Negeri Semarang dan Universitas Diponegoro merupakan dua perguruan tinggi di Kota Semarang yang berkomitmen dalam melaksanakan pembangunan tersebut. Penelitian ini bertujuan untuk menganalisis implementasi transportasi berkelanjutan di Universitas Negeri Semarang dan Universitas Diponegoro. Penelitian ini bersifat deskriptif kuantitatif. Pengambilan responden pada penelitian ini menggunakan teknik *snowball sampling* yang terdiri dari pengguna jalur pejalan kaki, jalur sepeda, bus kampus/transportasi umum dan tempat parkir di Universitas Negeri Semarang dan Universitas Diponegoro. Variabel sosial, ekonomi dan lingkungan menjadi variabel yang dianalisis dengan menggunakan metode gap analisis dan skoring untuk mengukur kriteria implementasi transportasi berkelanjutan. Hasil penelitian menunjukkan bahwa implementasi transportasi berkelanjutan di Universitas Negeri Semarang dan Universitas Diponegoro memperoleh persepsi sebesar 37.5%. Hal ini berarti pelaksanaan transportasi berkelanjutan belum optimal.

Kata Kunci: Transportasi berkelanjutan, pejalan kaki, tempat parkir, snowball sampling

How to Cite: Mashuri, M., & Pujiati, A. (2021). Implementation of Sustainable Transportation at Higher Institutions. Efficient: Indonesian Journal of Development Economics, 4(3), 1361-1375. https://doi.org/10.15294/efficient.v4i3.45228

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INTRODUCTION

The environment is the source of life for the entire ecosystem. Humans must be aware that natural resources have limitations; these limitations are in terms of quantity and quality, in terms of space and time. The development of technology and the continuous use of natural resources can cause environmental problems. According to. According to Umar et al., (2017a) and Umar et al., (2017b) Rapid population growth will encourage land use which has a negative impact on the environment.

One of the bad effects is global warming. According to Arne Naes in (keraf, 2010) and Umar & Dewata, (2018) stated that today's global environmental problems stem from the wrong way of thinking humans about nature and humans. Then followed by development in developing countries including Indonesia. The Indonesian government invites all elements in the world to return to a business that is environmentally friendly and sustainable. The Indonesian government also implements sustainable development in the regions through the green city program. Green city is a development concept that is well planned, characterized by the environment, and utilizes nature wisely to achieve community welfare.

The Indonesian government also involves the world of education through higher education institutions to reduce the impact of global warming. According to Buana et al., (2018) universities have an important role in creating an environmentally friendly future. Higher education also plays a role in building community participation in creating a sustainable future through the three pillars of higher education, namely education, research, and community service.

Good sustainable development can be done by integrating aspects of education with sustainable development through a green campus program. A green campus is a campus that pays attention to ecological areas by forming an environmentally friendly lifestyle through knowledge, community, health, and institutions for everyone on campus (Phramesti & Yuliastuti, 2012). Indonesia has an international standard green campus, namely UI GreenMetric.

The University of Indonesia initiated UI GreenMetric in 2010. The objective of this program is to identify campus programs and policies in sustainable development. In 2010 there were 95 campuses from 35 countries participating in the UI GreenMetric. Then in 2019, the participating campuses reached 779 from 81 countries in the world. UI GreenMetric has six assessment categories: Structuring and Infrastructure, Energy and Climate Change, Waste, Water, Transportation, Education, and Research.

UI GreenMetric conducts an annual assessment of the participating campuses. It is hoped that the UI GreenMetric World University Ranking can become a reference base in making the best policies to create a sustainable campus. So that the realization of a sustainable campus can help the government realize the green city program according to what has been planned by every region in Indonesia, especially regions that have many universities. One of the provinces with the most universities in Indonesia is Central Java. This data can be seen in Figure 1.

Central Java Province is the province with the fourth-highest number of tertiary institutions after DKI Jakarta, West Java, and East Java. The number of tertiary institutions in

Central Java reaches 274 universities or 8% of the total universities in Indonesia. This data can lead to population density in Central Java. Central Java has 35 districts/cities with a population of approximately 34 million people and Semarang City as the provincial capital. Population density has a negative impact on the environment, such negative impacts such as decreasing air quality. This is due to community activities in areas where universities are located. One of the activities that affect the level of air quality is the use of transportation.

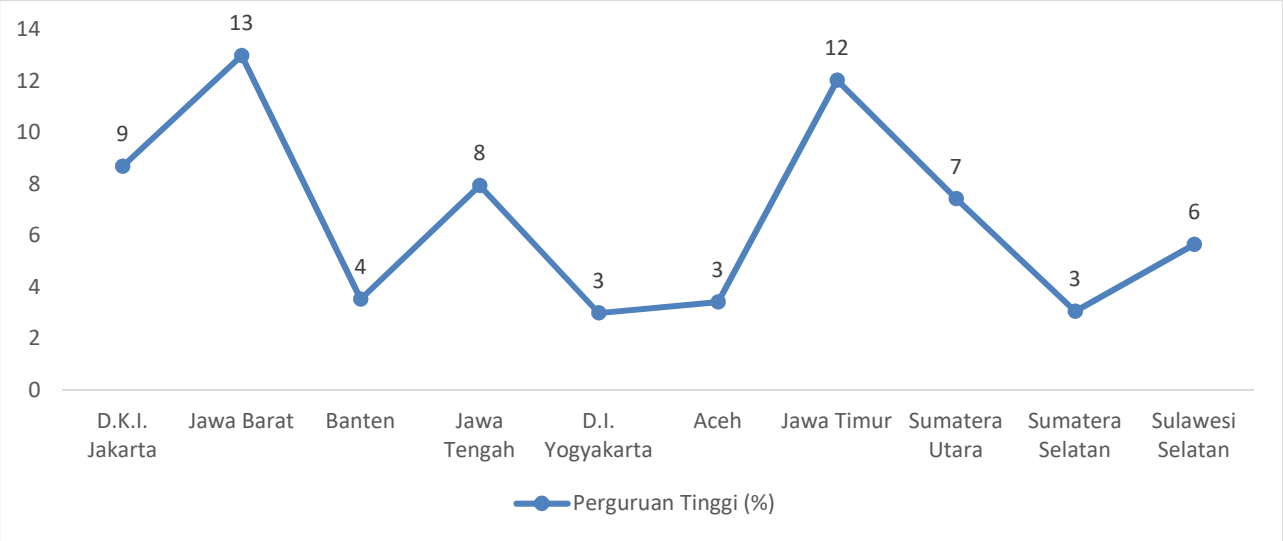

Figure 1. Provinces with the Most Universities in Indonesia in 2019
Source: Higher Education Statistics 2019 (Processed)

The air quality index in Central Java tends to fluctuate, the air quality in Central Java improved in 2016, but in the next two years it has decreased. Based on the air quality criteria of the Ministry of Environment, the index is classified as medium quality. Central Java Province encourages regencies/cities to implement green city programs to overcome air pollution problems, one of which is the city of Semarang.

The city of Semarang as the capital of Central Java Province is the axis of economy, industry, and education in Central Java. The Semarang City Medium Term Development Plan (RPJMD) contains a vision. "Semarang is a city of great trade and services towards a more prosperous society". Semarang City also has a mission "Creating a Dynamic Metropolitan City with Environmental Insights".

Table 1. Air Quality Index (IKU) for Central Java Province 2014-2018

Year	2014	2015	2016	2017	2018
Central Java	82.64	81.32	77.80	83.91	82.97

Source: Directorate General of Pollution and Environmental Damage Control

To support the vision and mission of the city of Semarang, which is advancing in trade and industry as well as the creation of sustainable transportation, it is necessary to have the role of universities as educational

institutions capable of encouraging the creation of a green city through the implementation of a green campus.

Sustainable transportation is an indicator that is constantly developing and is difficult to control. The government and universities have made green transportation policies to reduce this impact. The concept of green transportation or green transportation is where every activity that uses both public and private transportation models can be adjusted to an environmentally friendly goal. Semarang City has three state universities participating in the UI GreenMetric. The three universities are Diponegoro University, Semarang State University, and UIN Walisongo.

However, of the three universities, only two universities compete in the top 10 rankings of UI GreenMetric, namely Diponegoro University and Semarang State University. Semarang State University is a state university with a conservation perspective. Diponegoro University has also declared itself to be a green and environmentally friendly campus. In UI GreenMetric, the two-state campuses are in the top 10 green campuses in Indonesia.

Semarang State University and Diponegoro University occupy the sixth and fourth positions of the greenest campuses in Indonesia. Semarang State University is a campus with a conservation perspective. This is indicated by the existence of Semarang State University Chancellor Regulation No. 22 of 2009 and Semarang State University Chancellor Regulation No. 27 of 2012. Diponegoro University is also committed to supporting the realization of a green city in the city of Semarang through a green campus program.

One of the programs of Diponegoro University is the Initiative for Sustainability (UNITY). The program is devoted to dealing with environmental aspects including campus transportation. Some of the policies at Diponegoro University include providing free shuttle buses from city to campus and from campus to city, working with local governments to procure cheap buses that pass through campus and city environments, procuring bicycles at each faculty and also other units for use for free by anyone on campus, prohibiting parking in the campus area because the parking building has been prepared even though it is limited, preparing special parking for the disabled and creating a "nebeng" program for students.

Table 2. GreenMetric University in Indonesia Based on UI GreenMetric in 2019

Rating	University	Total score
1	University of Indonesia	8025
2	Bogor Agricultural University	7775
3	Gadjah Mada University	7625
4	Diponegoro University	7600
5	November 10th Institute of Technology	7550
6	Semarang State University	7400
7	sebelas Maret University	7050
8	Indonesian Islamic University	6925
9	Telkom University	6550
10	Padjadjaran University	6475

Source: UI GreenMetric, 2020

The indicator that needs to be focused on is the transportation indicator. In the UI GreenMetric assessment, Semarang State University and Diponegoro University have experienced a fairly good increase in

transportation indicators. However, this is still contrary to the actual situation on campus, where motorized vehicles for students, lecturers, and educators are still quite massive. This is reinforced by research conducted by (Wahyuningsih, et al, 2017) where the results of this study indicate that the mode of transportation that is the choice of students and staff at the Faculty of Mathematics and Science, State University of Semarang is to use motorbikes and cars with the percentage of use reaching 73%. Meanwhile, the use of public transportation is only 2%. This shows that the use of private vehicles on campus is still high.

Semarang State University and Diponegoro University are currently working to build advanced and environmentally friendly transportation to reduce the use of private vehicles. However, achieving sustainable transportation is not easy, the obstacles faced in realizing sustainable transportation are financial resources and the awareness and behavior of everyone in using environmental transportation.

Semarang State University and Diponegoro University have launched several programs related to campus internal transportation. Semarang State University develops internal transportation services, pedestrian and bicycle lanes, parking arrangements, development of signs, and provision of public transportation (Bangvasi UNNES, 2014).

However, the realization has not been fully implemented optimally. This is due to inadequate facilities and the limited number of internal campus transportation available (Prihanto, 2017). Then in the campus environment of the State University of Semarang, the pedestrian paths are not fully connected and do not have optimal performance either. Both in terms of comfort and friendliness for disabled people (Satriadi L, et al., 2016).

Diponegoro University also develops internal transportation through the Zero Emission Vehicle (ZEV) program. The program is carried out by providing internal campus transportation facilities and free bicycles, vehicle-free space. Then collaborating with the government in procuring public transportation and providing pedestrian facilities (Diponegoro University Sustainability Report, 2019).

But in reality, the program has not run optimally. This is because the pedestrian and bicycle paths have not been well realized at several points on the campus. Another problem is that providing internal transportation such as campus buses, bicycle facilities, and bicycle parking spaces is not optimal. Then the use of vehicles in the campus environment is still quite high. It can be seen from the number of private cars that enter the campus area averaging 350 cars/day. Thus causing congestion at certain hours (Hapsari et al., 2014).

University and Diponegoro University have provided sustainable transportation facilities. However, the existing program still has several problems, where the concept of green transportation in supporting the green city program has not run optimally in the two universities. For this reason, it is necessary to have good cooperation between the campus community as users of the facilities and the campus as providers.

This research is important to determine the actual implementation of sustainable

transportation through assessing the campus community as facility users for the efforts that the campus has made. Then the assessment can be used by the campus as input in realizing a sustainable transportation system following the needs of the campus community.

RESEARCH METHODS

This research is quantitative descriptive. This study uses primary data obtained from distributing questionnaires and observations. Then this study uses secondary data obtained from literature, journals, and information systems Semarang State University and Diponegoro University. This research uses the snowball sampling technique. The samples in this study were students, lecturers, and active educators at Semarang State University and Diponegoro University.

The variables are economic, social, and environmental variables with sustainable transportation indicators such as comfort and safety, accommodation, availability of supporting facilities, affordable rates, and friendliness to disable. Then the data is analyzed using gap analysis with the scoring method on the modified sustainable transportation indicator (Center for Sustainable Transportation, 2002). These indicators are pedestrian lane facilities, bicycle paths, campus buses/mass public transportation, and parking facilities. The formula for calculating the percentage of sustainable transport adoption is as follows:

$$\text{Pst} \ldots\ldots\ldots (3) = \frac{(\text{Xt})}{(\text{Xmax})} x100\% \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The criteria for implementing a sustainable transportation program can be seen in table 3.

Table 3. Percentage Criteria For Implementing Sustainable Transportation Program

Percentage	Criteria
0-20%	Very bad
21-40%	Bad
41-60%	Pretty good
61-80%	Good
81-100%	Very good

Source : Data Processed, 2020

RESULTS AND DISCUSSION

In the pedestrian lane facilities at Semarang State University and Diponegoro University, the indicator with the lowest performance is pedestrian comfort. The pedestrian lane comfort indicator gets a perception of 37.95%. Then the integration of pedestrian paths with other modes of transportation is the highest indicator with a perception of 53.37% (Figure 2).

Then, in general, the performance of the pedestrian paths at Semarang State University and Diponegoro University obtained a perception of 41.64%. This means that the overall performance of the pedestrian path is quite good. The pedestrian paths at Semarang State University and Diponegoro University have not performed well due to several problems. These problems include the unavailability of safe and secure pedestrian paths and the absence of an appropriate arrangement of green open spaces..

Comfortable and safe pedestrian paths are important in increasing the interest of the campus community to carry out activities in the campus environment on foot. Another problem is the lack of vegetation. However, there are several locations where there is vegetation and lush vegetation, and there are

some locations that do not provide full protection for pedestrians, such as protection from the sun, rain, pollution, and noise. Whereas the existence of suitable vegetation is an important aspect to increase public interest in walking (Kim et al., 2018).

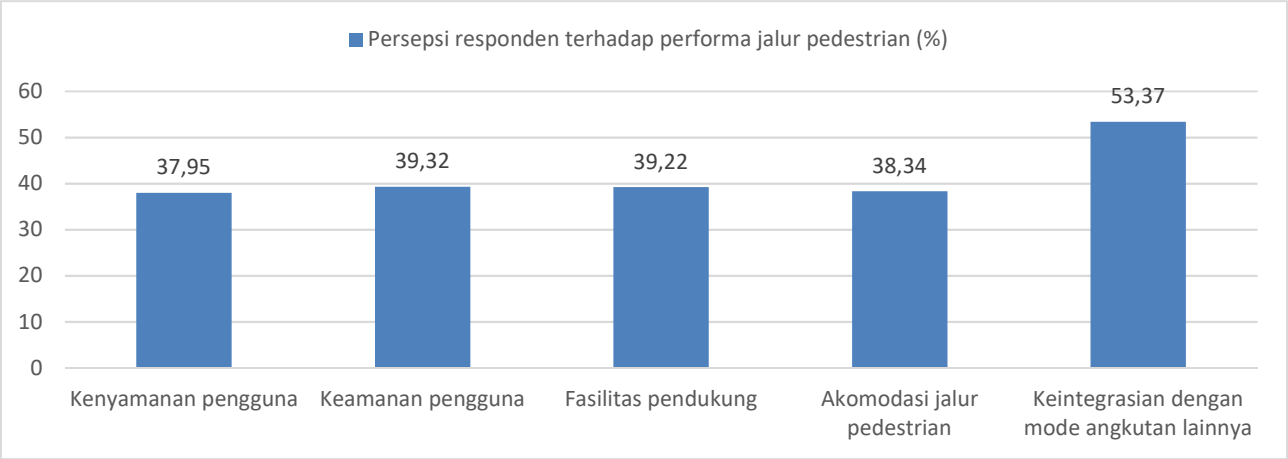

Figure 2. Perceptions of pedestrian lane users
Source: Primary data processed, 2020

Pedestrian paths that are not yet comprehensive and connected in the campus environment also provide different obstacles for pedestrians. This means that pedestrians must be in the same lane as motorized vehicle users, so that pedestrians must be more careful. This is following the results of research conducted by (Zhang et al., (2014), which shows that the pedestrian path, integrated with other facilities and protected by vegetation along the pedestrian path, will increase people's interest in walking in their activities.

The sustainable transportation indicators stated by the Organisation Of Economic Transportation and the National Round Table On The Environment And The Economy (OECD, 1996 and NRTEE, 1996) state that there are three aspects to sustainable transportation. The three aspects are social, economic, and environmental aspects. The social aspect relates to the community's convenience, security, and comfort in accessing pedestrian paths, especially for people with disabilities. However, the existing pedestrian paths still do not properly meet the social aspects. This can be seen from the public perception of the safety and comfort of the pedestrian path, which is still below 50%.

The next aspect is the economic aspect. The economic aspect relates to the availability of supporting facilities and the integration of pedestrian lane facilities with other facilities. This integrated facility is expected to impact the increased productivity of the campus community. This has been fulfilled, seen from the respondent's perception that the integration of bicycle lanes with other facilities is more than 50%..

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However, it is still not optimal in terms of supporting facilities because the supporting facilities around the pedestrian path are still lacking. Then in terms of environmental aspects, it is still not fulfilled properly. This is due to the pedestrian lane facilities that are not fully available in the campus environment, so interest in using the pedestrian path is still lacking. Then in terms of the condition of the pedestrian paths, it is also not optimal because several pedestrian paths are already damaged and slippery. In bicycle lane facilities, the indicator that has the lowest performance is the level of security with a perception of 27.51%. Then the bike lane integration becomes the indicator with the highest performance with a perception of 34.73% (Figure 3). The current average bicycle path performance at Semarang State University and Diponegoro University is 32.08%. This indicates that the performance of the bike path is still poor.

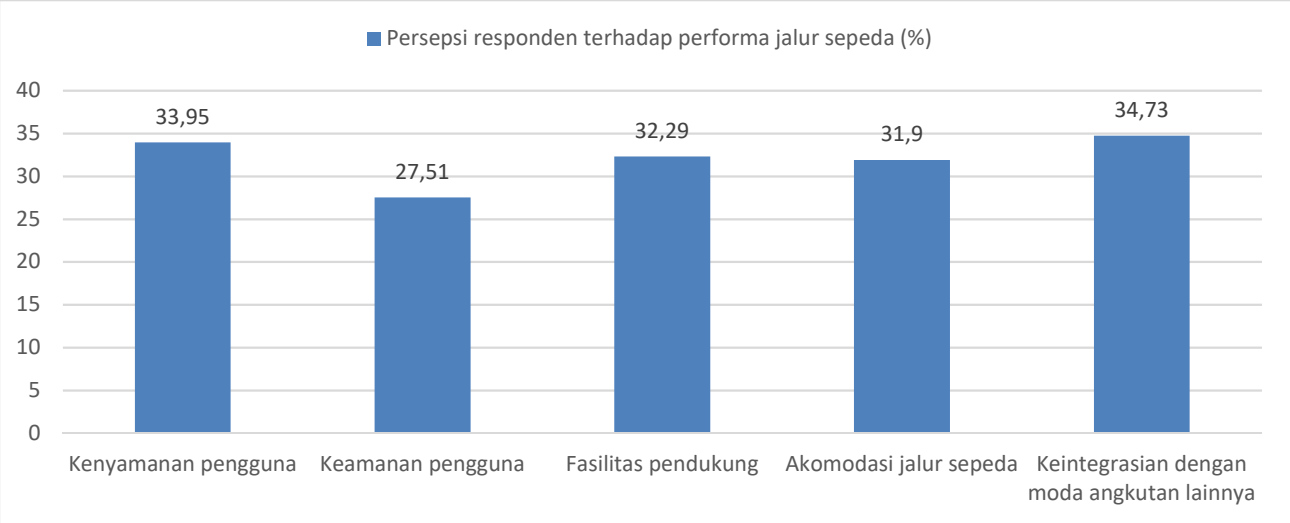

Figure 3. Perceptions of Bicycle Path Users
Source: Primary data processed, 2020

This performance assessment means that the bike path is still not optimal and has problems. One of the obstacles is the uneven cycle paths in the campus environment. This can be seen at the Diponegoro University around the Faculty of Medicine, Faculty of Economics, and the Faculty of Animal Husbandry and Fisheries. There are still no bicycle paths available. Semarang State University also has problems where the bicycle paths are not evenly distributed in the campus environment. The bicycle path is only in the rectorate area and has not been comprehensive to the east of the campus.

Bicycles are environmentally friendly, easy transportation, and do not cost more. Cycling can also improve physical fitness. However, bicycle lanes have not been integrated with public transportation and special parking spaces for bicycles. This problem encourages people to

find still it difficult to switch to using bicycles. This follows the research conducted by (Karanikola et al., 2018). The research shows that bicycles are a popular, easy, and inexpensive form of transportation, and are useful in health but still lacking in safety.

The bicycle paths at Semarang State University and Diponegoro University must comply with the sustainable transportation indicators stated by the Organisation Of Economic Transportation and the National Round Table On The Environment And The Economic (OECD, 1996 and NRTEE, 1996) .

However, the public's perception of the bicycle paths at Semarang State University and Diponegoro University has not fulfilled these three social, economic, and environmental aspects. This can be seen from the perception of the campus community, which is still less than 50% in all indicators. The social aspects have not been fulfilled due to the lack of safety and comfort factors.

This is because the bicycle lanes are not yet comprehensive and not optimal. Then the existing bicycle lanes are not well integrated, and not all of them have been fulfilled. This impacts the economic aspect where the productivity of the campus community using these facilities is hampered. Then the environmental aspects have not been fulfilled properly. This has an impact on the use of motorized vehicles which tends to be more frequent than the use of bicycles on campus.

Time efficiency is the lowest-performing indicator at Semarang State University and Diponegoro University on-campus bus facilities/mass public transportation. This is indicated by the respondent's perception of time efficiency of 37.37%. Meanwhile, the indicator with the highest performance was the campus bus fare/mass public transportation with a perception of 66.15% (Figure 4). The average performance of mass public transportation/campus buses is 50.24%. These results indicate that the performance of mass public transport is quite good compared to perceptions of pedestrian and bicycle lanes.

The low perception of travel time efficiency is due to several factors such as accessibility and convenience in accessing mass public transportation, which is still not optimal. Facilities such as bus stops are already available at Diponegoro University, but the numbers are still limited. Then there are quite a lot of bus stops at Semarang State University and are scattered in almost all campus areas.

Public transportation rates are the highest performing indicator at Semarang State University and Diponegoro University, which means that most groups' public transport fares are affordable. This is following the affordability aspect expressed by (Litman, 2010). According to Litman, good transportation services only consume less than 20% of the income of low-income residents. This is also consistent with the economic principles described by the Organisation Of Economic Transportation and the National Round Table On The Environment and The Economy (OECD, 1996 and NRTEE, 1996).

Time efficiency is the lowest perceived value in the public transportation indicator. The low perception of travel time efficiency is due to several factors, such as the long travel time to reach the destination, waiting time, and public transportation routes that are still integrated with other public transportation routes. So that it affects

the travel time of public transportation (Rithoma & Rahmatullah, 2015). Another opinion states that travel time is the most important aspect which forms the basis for the community to use public transportation (Gupta et al., 2018).

This is also consistent with the research (Rasyid et al., 2020) which explains that time efficiency is a consideration by public transportation users. Public transportation that is efficient and faster than private vehicles has an impact on people's interest in using public transportation more than using private vehicles. The ease of accessing public transportation starting from the bus stop and returning home is also very influential.

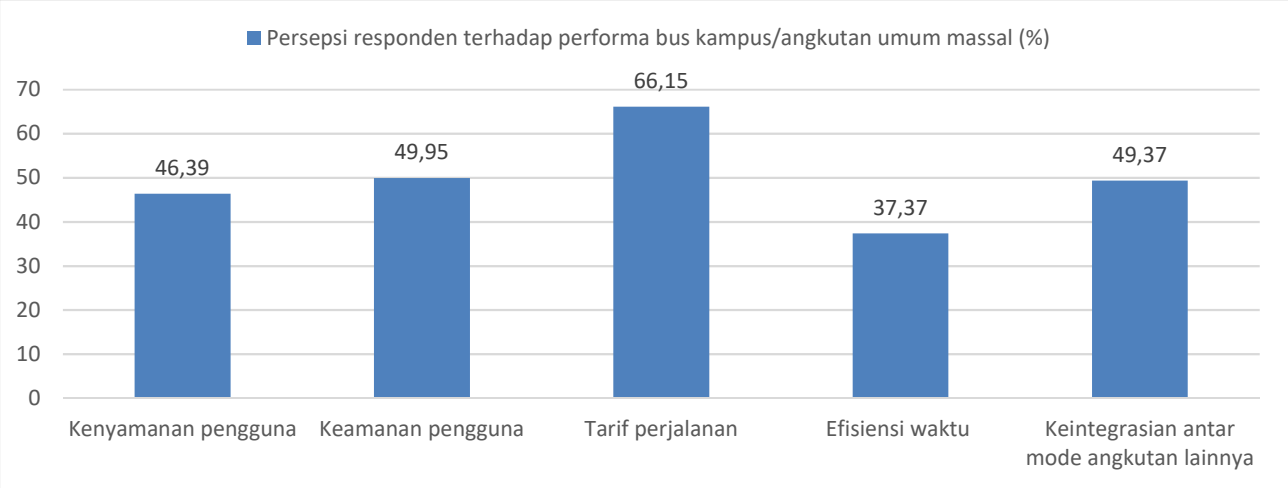

Figure 4. Perceptions of campus bus/mass public transportation passengers
Source: Primary data processed, 2020

Especially if the supporting facilities in reaching public transportation such as pedestrians, bus stops, and parking lots can provide a sense of security and comfort. This is in line with research conducted by (Setyono, 2019) which explains that easy access to public transportation is very important in terms of comfort, safety, and supporting facilities. When there are aspects that are still bad, it tends to affect the interest of the campus community in using public transportation.

Judging from the level of comfort and safety of mass public transportation/campus buses at Semarang State University and Diponegoro University are good enough. This can be seen from the mass public transportation that can be accessed in locations close to the campus environment, especially for Semarang State University. Meanwhile, at Diponegoro University, public transportation users must leave the campus environment or can use online-based public transportation. In terms of vehicle performance, it is also quite good because the number of vehicles is sufficient and there are officers in public vehicles such as BRT / Trans Semarang.

Parking point facilities that are friendly to disable are the indicators with the lowest performance with a perception of 22.85%. Then the indicator of the level of parking space accommodation in accommodating vehicles becomes the indicator with the highest

performance with a perception of 51.32% (Figure 5). The average perception of parking space is 40.80%. This means that the performance of the parking facilities at Semarang State University and Diponegoro University is not good enough.

The use of private vehicles is still the main choice for campus communities at Semarang State University and Diponegoro University. The parking lots that are currently available at Semarang State University and Diponegoro University are performing quite well. Semarang State University has parking facilities available in almost all faculties, although with limited facilities.

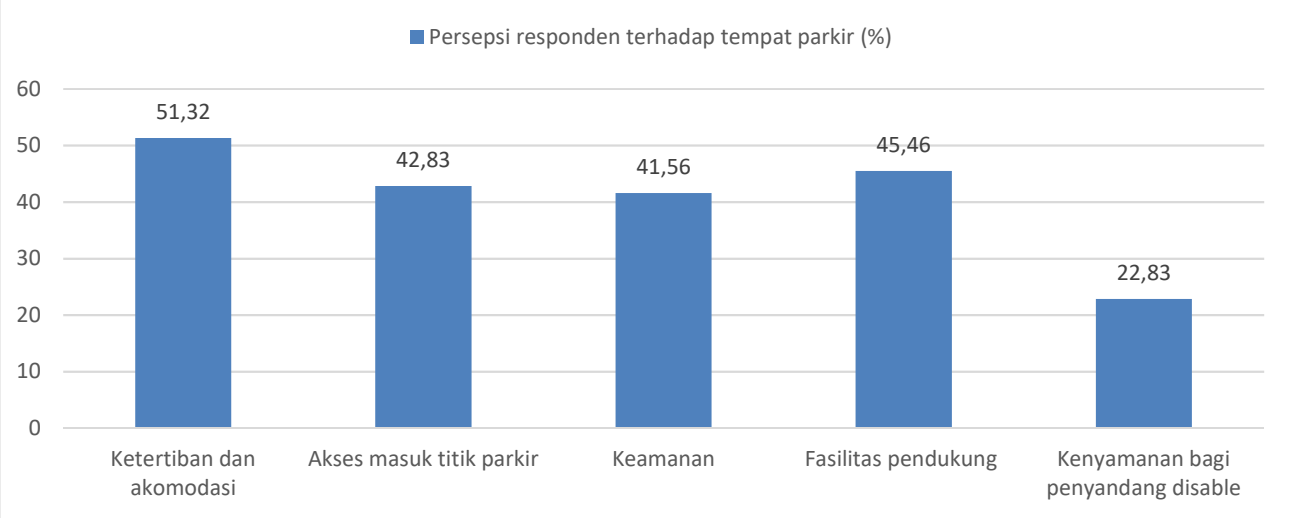

Figure 5. Vehicle users' perceptions of parking spaces
Source: Primary data processed, 2020

Parking facilities at Semarang State University are available around the university's main gate so that it can minimize the use of motorized vehicles in the campus environment. Then there is also a multipurpose building between the east and west campuses, a parking location along with quite large facilities and capacities. Parking facilities are also available at Diponegoro University.

Parking facilities are available in almost all faculties at Diponegoro University with good supporting facilities, and roofs protect some parking spaces, but accommodation is also still limited. Then at Diponegoro University, there are also shared parking facilities next to the Diponegoro University rectorate to reduce motorized vehicles in the campus environment.

In terms of safety and comfort, the two universities have performed quite well and the level of accommodation. There are already several parking lots with special markers for the disabled in some locations. However, the comfort aspect for the disabled is still the indicator with the lowest perception. The low perception of respondents is due to the absence of special parking space for persons with disabilities, which is not evenly distributed throughout the campus parking lot, which can then facilitate access to carry out activities in the campus environment.

The average performance of the parking facilities at Semarang State University and Diponegoro University is quite good. However, in terms of hospitality to disable, it is still lacking. The increasing use of motorized vehicles for the campus community means that the parking lot facilities cannot accommodate all motorized vehicles.

This is in line with research conducted by (Januar Nabal, 2014) which explains that the existing parking facilities cannot necessarily accommodate vehicles on campus. This is because the number of motorized vehicle users is more than the available facilities. It is necessary to have limitations that can be used to realize sustainable transportation. So that it does not cause the public to use private vehicles(Nag et al., 2018). This limitation can be supported by maximizing existing parking space facilities.

Then the parking lot can be integrated with alternative transportation provided by the campus, such as free bicycles and good pedestrian facilities. So that with good and integrated parking facilities, it can support social aspects about accessible parking spaces. Then it can fulfill environmental aspects as a means of minimizing the use of private vehicles in the campus environment, which is integrated with alternative transportation to reduce the impact on the environment.

Furthermore, the fulfillment of economic aspects in terms of campus community activities that can run more productively and following the principles of sustainable transportation. This is because of a parking lot that can make it easier to access work locations and is integrated into a separate consideration in reducing the use of private vehicles.

The score for each indicator of the implementation of sustainable transportation at Semarang State University and Diponegoro University in table 4 (see appendix 1) varies considerably. The pedestrian lane indicator got a score of 2, and the bicycle lane got a score of 1, then the campus bus/mass public transportation got a score of 2, and the parking lot got a 1. Then, the scores from each indicator are added up to calculate the percentage of the implementation of sustainable transportation at Semarang State University and Diponegoro University using equation (3).

Based on the calculation, the percentage of the implementation of sustainable transportation at Semarang State University and Diponegoro University is 37.5%. This means that the implementation of sustainable transportation in Semarang State University and Diponegoro University has not been implemented properly. The study results (Dell'Olio, Iheas, & Cacin, 2010) state that effective and efficient transportation has a good impact on the social aspects of society.

They stated that people's perceptions differed before and after traveling using a vehicle. This is related to service, waiting time, and driver kindness. They also stated that after using a vehicle, the importance of waiting time and giving kindness to the driver was neglected. Other variables that can change are vehicle quality, driver kindness, waiting time, travel time, comfort and safety, and service.

Therefore the perception of the campus community needs to be known to take the necessary policies, namely building the perception of the campus community and interested parties. Several transportation policies on campus, such as improvements to physical infrastructure and regulations on restrictions on vehicle use, have been implemented.

However, this cannot go well on its own. Therefore it is necessary to plan for sustainable transportation. Then an approach that is not only limited to one source needs to be taken to increase awareness of the importance of sustainable transportation (Xia et al., 2017).

To improve the implementation of sustainable transportation, it is necessary to improve the quality of public transportation services and also integrate public transportation with other supporting facilities. This policy is carried out to increase the interest of the campus community in using public transportation or environmentally friendly transportation.

This is in accordance with the research conducted by Nihayah & Yunila (2019) which states that The wider choice of mass public transportation modes that are well integrated is expected to be able to increase public interest in using mass transportation more than private transportation. So that transportation problems, especially congestion can be reduced.

In realizing sustainable transportation on campus, it is necessary to cooperate from all walks of life, including students, lecturers, educators, and the campus bureaucracy as managers and policymakers. This was also expressed by Mcleod et al., (2017) which states that future transportation requires support and collaboration between institutions as well as harmony between development and transportation to achieve good goals.

Then research on public perceptions is important to do. As expressed by Vilakazi & Govender (2014) that service providers, planners, and the government or campus need to know people's perceptions and seek appropriate strategies that are tailored to the results of these perceptions. So that the development on campus can be in accordance with what the campus community needs to be able to realize sustainable transportation in the campus environment.

CONCLUSION

Based on the study and discussion results, it can be concluded that Semarang State University and Diponegoro University are committed to realizing the implementation of sustainable transportation through green campus and green transportation programs. In this program, Semarang State University and Diponegoro University provide facilities related to sustainable transportation such as pedestrian paths, bicycle lanes, campus buses / mass public transportation, and parking lots. However, these facilities do not have optimal performance.

This can be seen from the four sustainable transportation variables that still have performance below 100%. Respondents' perception of the pedestrian route is quite good, with an average value reaching 41.64%. Meanwhile, the condition of the bicycle paths is still bad, with an average perception of only 32.08%. Then the performance of mass public transportation/campus buses got a pretty good perception with an average perception of 50.24%.

Meanwhile, respondents' perceptions of parking space performance are still not good, with an average value of 40.80%. Overall, implementing sustainable transportation at Semarang State University and Diponegoro University is still not optimal, with an application value of 37.5%. The not yet optimal implementation of sustainable transportation at

Semarang State University and Diponegoro University is due to several obstacles.

These obstacles include facilities that have not been fully developed, facilities that have not provided comfort and security for facility users, especially people with disabilities, and the integration between facilities is not yet optimal. Therefore, awareness of the importance of sustainable and environmentally friendly transportation is very important. This research shows the importance of cooperation from all stakeholders to create sustainable transportation.

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APPENDIX

Appendix 1. Scoring Results for Sustainable Transportation Indicators

No.	Indicator	Actual Conditions	Ideal conditions	Score
1	Pedestrian path	The pedestrian paths at Semarang State University and Diponegoro University have not provided sufficient comfort with the perception of 37.95%. Then security gets a perception of 39.32%. Supporting facilities on the pedestrian path gained a perception of 39.22%. Then the level of accommodation got a perception of 53.37%. The integration of mass public transportation gained a perception of 53.37%. The average performance of the pedestrian paths is quite good with a perception of 41.64%.	Pedestrian paths provide a sense of security and comfort and can accommodate various needs. Then the bicycle lane has good supporting facilities with a performance of> 75%.	2
2	Bike Path	The bicycle paths in the campus environment of Semarang State University and Diponegoro University have a perceived comfort level of 33.95%. Then the security level is 27.51%. Supporting facilities that are available get a perception of 32.29%. Furthermore, the level of accommodation for motorists obtained perception of 31.90%. Finally, the level of integration obtained perception of 34.73%. The average condition of the bicycle paths and all its facilities received a perception of 32.08%.	The bike path at Semarang State University and Diponegoro University has a good level of security, comfort, and facilities with a perception of> 75%.	1
3	Campus bus / mass public transportation	Campus buses / mass public transportation have a perceived comfort level of 46.39%. Then for the level of security obtained perception of 49.95%. Furthermore, for the perception of bus fare, it is in the perception of 66.15% and time efficiency is at the perception of	Condition of campus buses / mass public transportation at Semarang State University and Diponegoro University is in good condition with a perception of> 75%.	2

No.	Indicator	Actual Conditions	Ideal conditions	Score
		37.37%. Then for integration with other public transportation, the perception is that it is 49.37%. The average public transportation/campus bus facilities, in general, is 50.24%.		
4	Parking lot	The condition of parking lots at Semarang State University and Diponegoro University at the level of order and accommodation gained a perception of 51.32%. Then for access to the parking lot, there is a perception of 42.83%. Furthermore, for security got a perception of 41.56%. Then for supporting facilities, the perception is that of 45.46%. Meanwhile, the disabled-friendly parking lot received a perception of 22.85%. The average perception of parking space facilities is 40.80%.	The condition of the parking place on Semarang State University and Diponegoro University is in good condition and have good supporting facilities with a perception of> 75%.	1
The total score of the assessment				6
Maximum Value				16

Source: Primary data processed, 2020