Priority Factor Analysis to Improve Cycling Activities in Campus: Study Case - Sebelas Maret University

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Abstract: Multiculturalism in Indonesia need to be concern based on 250 tribes with diversity on language and religion. Efforts leading for the preparation of the future generations within the culturally heterogeneous are reflected in modern world education strategies. As the development of economic world, considering the environmental impacts carried out an issue called Sustainable Development. University as one of educational institution began to develop various programs based on sustainable development, one of them known as Green Campus. With various cultures meet, the application of Green Campus must be done with clear regulation. Sustainable transportation called bicycle is a potential transportation to be develop. The purpose of the research is to get factors that should be prioritized in effort to increase cycling activities within campus based on the assessment by the respondents. The result of the assessment is processed by analysis of four priority quadrants of Importance Performance Analysis (IPA). Based on the analysis of four quadrants, three priorities are recommended for improvement. These factors are grouped in first priority, second priority, and third priority.

1 INTRODUCTION

Indonesia is country with 250 different tribes accompanied by diversity on languages and religions (Center for Data and Statistics of Education and Culture, 2016). Multiculturalism need to be concern because these differences. A treatment is required to avoid division because of the difference. Efforts leading for the preparation of the future generations within the culturally heterogeneous are reflected in modern world education strategies (Kusa, J., Sladová, J., & Kopecký, 2014). Education that becomes a place for diversity should be accompanied with an organized program, especially in countries with high diversity.

The development of world economy without considering the environmental impacts carried out an issue called sustainable development. From sustainable development knowledge platform, aim to keep the economic progress simultaneously with protecting the environment for long term periods. Seeing this issue, University as one of educational institution began to develop various programs based on sustainable development, one of them known as green campus.

This research was conducted at one of the universities in Indonesia which has been focusing in Green Campus since the year 2013. Bicycles become one of the friendly vehicles which have potential to developed as a green campus transportation in Sebelas Maret University. Evaluation is needed for applying Green Campus. This research is to analyze the factors that become priority to increase cycling activity in UNS campus. Importance Performance Analysis will give the result by interest assessment and performance assessment from academics about factors must be prioritized for improvement cycling activities within campus. This research using Importance Performance Analysis to produce recommendation based from assessments of employees and students about cycling activities.

Campus Transport Management (CTM) is the application of Transport Demand Management to the campus environment (Victoria Transport Policy Institute, 2015). The CTM program to increase the choice of transportation and reduce the number of trips by car by students on the campus environment. Non-motorized transportation is one of CTM's programs on non-machine transport activities which are walking and cycling. Cycling is known as a clean and sustainable mode of transportation that is an

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important part of the intermodal plan for sustainable urban travel. The use of bicycles in campus can be done as a contribution of educational institutions as realization of an environmentally friendly campus.

The use of bicycles as one of the alternative vehicles that need to be developed, because the future development of alternative fuel for vehicle needs is increasingly limited (Hanavie, A., & Setiawan, 2014). Study case at Sebelas Maret University showed that bicycles became the second choice of environmentally friendly vehicles after the use of bus on the campus. Bicycle is one option of vehicles that support the movement of green campus (Rustomo, O. B., Handayani, D., & Legowo, 2015).

2 METHODOLOGY

Location of the research at Sebelas Maret University Surakarta address at Jalan Ir. Sutami No 36A, Kentingan, Jebres, Surakarta, Central Java. Sampling using the method of taking Non-Probability Sampling with Purposive Sampling technique. The number of respondents used is determined by Isaac and Michael formula, with 5% significance level. From the calculation, the results found for respondents is 380 respondents minimum. The result of the assessment is processed by analysis of four priority quadrants of Importance Performance Analysis (IPA). Based on the analysis of four quadrants, three priorities are recommended for improvement. This research using Likert scale given by the respondents. Table 1 show the variable used as factors (Husin, 2018) that will be divided into four quadrant priorities.

Table 1: Variable as cycling factor priority.

Variable	Description
Variable 1	Ease of cycling within campus
Variable 2	Availability of cycling access within campus
Variable 3	Safety for cycling within campus
Variable 4	Safety cycling to cross inside the campus
Variable 5	Road pavement for cycling
Variable 6	Shade street for cycling activities
Variable 7	Lighting at night
Variable 8	Parking spaces for bicycles
Variable 9	Location of bike parking
Variable 10	Security of bike parking
Variable 11	Role of cycling activity from faculty
Variable 12	Socialization for cycling
Variable 13	Award for cyclist on campus
Variable 14	Availability of community / Activity for cycling Activities

3 ANALYSIS AND RESULT

3.1 Validity and Reliability Analysis

The validity of this research using bivariate Pearson with 5% significance level with r table distribution value (r critical) 0.339. The lowest validity score for indicate performance was 0.381 and score for indicate importance was 0.487. This shows the fourteen variables have fulfilled the validity test requirement. Alpha Cronbach formula used for reliability analysis in this research is as Table 2.

Table 2: Reliability analysis.

r_n	Results	Description
r_1	0,871	Performance Assessment by Student
r_2	0.904	Assessment of Importance by Students
r_3	0.870	Performance Assessment by Employees
r_4	0.904	Assessment of Importance by Employees

From the results, the reliability values obtained perfect reliability and high reliability.

Respondent's Characteristic

Using transportation within the campus, 82% students and 68% employees using motorcycles to have mobility within campus. Total users using motorcycles is 84% while users of bicycle are 1% that used by students. This shows that user of bike transportation within campus is very low.

Frequency of using bicycle in daily activities shows 70% of students never use bicycles within a month. The next largest percentage found that 11% of students use bicycles for daily activities are more than four times a month. For the employees, as much as 79% of employees never use the bike for daily activities. The next largest percentage of employees is 18% using bicycle more than four times a month. This indicates that the use of bicycles has the potential to be developed within the campus due to the habit of using bicycles in daily activities.

In the last three months 94% of students never use bikes on campus. Similarly, 94% of employee respondents never use bikes for activity on campus. This shows that the academics of UNS almost never use bikes on campus.

Importance Performance Analysis

Assessment given by 377 students and 34 employees was calculated on average for each variable. The

value of x and y of each variable will be placed according to the calculation result. Then the average value of total results is used as a quadrant divisor border. Table 3 is the result of calculating the average score given [6].

Table 3: Average assessment from student and employee.

Average of Student's Assessment			Average of Employee's Assessment		
Variable	$\bar{x}$ (Performance)	$\bar{y}$ (Importance)	Variable	$\bar{x}$ (Performance)	$\bar{y}$ (Importance)
1	3.13	3.89	1	3.09	4.44
2	2.80	4.06	2	3.21	4.50
3	3.01	4.40	3	3.03	4.68
4	2.76	4.41	4	2.88	4.79
5	2.74	4.22	5	3.00	4.35
6	3.36	4.25	6	3.65	4.44
7	2.12	4.58	7	2.47	4.50
8	2.47	4.26	8	2.53	4.44
9	2.51	4.20	9	2.50	4.26
10	2.61	4.45	10	2.71	4.62
11	2.23	3.94	11	2.12	4.44
12	1.99	3.87	12	2.03	4.24
13	2.10	3.56	13	1.82	3.82
14	2.19	3.81	14	1.85	3.82
∑	36.02	57.91	∑	36.88	61.35
Average	2,57	4,14	Average	2,63	4,38

The results of subsequent average calculations are plotted according to the values of x and y obtained from each variable. Figure 1 and figure 2 are the result of assessment analysis with IPA method.

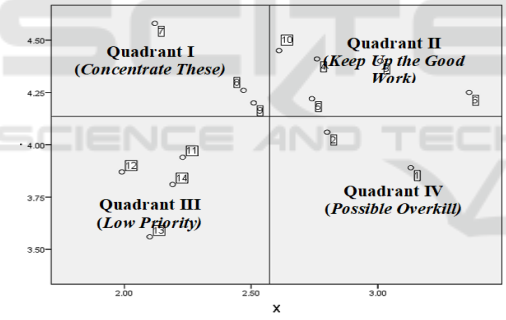

Figure 1: Importance performance analysis of student assessment.

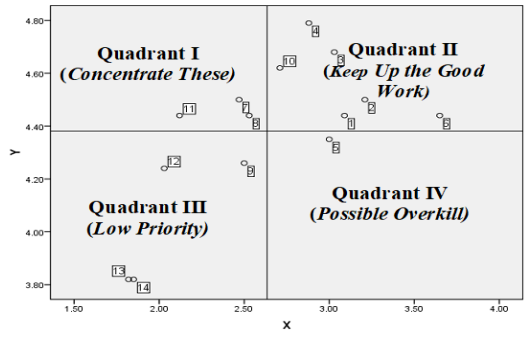

Figure 2: Importance performance analysis of employee assessment.

4 DISCUSSION

4.1 First Factors to Improve (1st Priority)

As top priority and should be improved because of the low performance appraisal with the high importance. Bicycle parking space has been the result from students and employee assessment. The dock or parking space for bicycles will increase the activity of cycling activities (Campbell, A. A., Cherry, C. R., Ryerson, M. S., & Yang, 2016). This can be understood because with the parking space for bicycle will trigger the interest of the campus community to cycling. With the parking space, academics feels bicycle can be placed safely. To improve cycling activities within campus, needs to done the addition of parking space for bicycle. The next factor is street lighting at night. Supported that adequate illumination in the dark becomes a factor in cycling activity (Engels, 2016). Current conditions found when dark, it found street lighting has not been spread evenly. Seeing the lighting at night has a high influence and interest for cycling activities, the recommended policy is to add street lighting within the campus. Another factor included in the first priority according to the student assessment is the location of bike parking placement. The results of the assessment of student accordance (Hanavie, A., & Setiawan, 2014) which reveals bicycle parking close to the lecture building will affect the student's desire to cycling. The results of the assessment given by the students as the largest academics group making this factor into the main priority. The policy should be taken is to bicycle parking for students at each main building where the collage activities. Next factor as a top priority according to the employee is the role of faculty in cycling activities. This factor is development from research on the movement in support of Green Campus (Sumabrata, J., Tjahjono, T., & Gituri, 2015). The existence of faculty involvement in cycling activities becomes a new finding as a factor that has a major influence in increasing cycling activities. This factor is also a top priority for cycling activities within the campus. This can be used as a feature of the Indonesian state where the role forcing will give major effect. From the result of the analysis it is good to set rules for using bikes within the campus once a week or once a month.

4.2 Next Factors after Major Factors (2nd Priority)

Safety in cycling activities on the streets inside the campus becomes the second priority in improving cycling activities. Performance and importance analysis show safety to avoid accidents while in touch with other modes of transportation within the campus already good, and the importance of safety when cycling within the campus is also high. These results support study which says safety is important especially with special lane (Sumabrata, J., Tjahjono, T., & Gituri, 2015). It can be done is to provide markers lane and signs on the road along the campus for bicycle. The safety factor of bicycle users when crossing the campus supported from the research that safety factor to cross is important in cycling activities (Sumabrata, J., Tjahjono, T., & Gituri, 2015). The policy that can be done is to install some careful signs of cycling vehicles at intersections inside the campus to remind other vehicles. The shade of the road for cycling supported (Utama, D. C., & Sugiri, 2014) that protection of unfavorable weather will affect the desire for cycling. Improved performance that can be done by planting shady trees on the roadside within the campus that is still exposed to direct sunlight. The next factor included in the 2nd priority is the safety of the bicycle parking. The results of this interest assessment support (Hanavie, A., & Setiawan, 2014) that parking safety has a high level of importance, especially seeing the bike easier to be stolen than other vehicles. Policies that can be done is to make a bicycle parking with lock facilities. Another factor is the road pavement, road surfaces suitable for cycling are important things (Sumabrata, J., Tjahjono, T., & Gituri, 2015). Seeing the usage of paving has a weakness in the resistance to accept repetition load. Fixing the bumpy paving road as a daily activity can be applied. According to employees, the second priority is the ease for cycling. These results support research about the convenient for cycling and improving cycling activities is about the bicycle lending named bike-sharing (Utama, D. C., & Sugiri, 2014). Seeing the condition of the hilly surfaces, it can be handled by using bicycle with special facilities for hilly areas. Accessibility for cycling as a second priority on employee assessment. This is supported research about the importance of special access to improve the convenience of bicycle users (Sumabrata, J., Tjahjono, T., & Gituri, 2015). Policies can be done is to provide a lane for the bike along the road inside the campus.

5 FACTORS TO BE IMPROVED WITHOUT BEST RESOURCES (3rd PRIORITY)

The socialization activities for cycling within the campus have low performance and are considered not to have a high level of importance. This factor can be socialized at university event, especially related to the students. Awarding for bike users on campus is placed in the 3rd priorities in both employee and student perspective. The policy that can be done for employees or students is to give bike prizes in some university events. The availability of community or activities for cycling together. On the results of characteristic analysis, the use of bicycles within the campus are more than 90% of UNS academics never use bikes inside the campus. Interesting to point out the results of the characteristic analysis of the frequency of the use of bike transport modes in daily activities with the results using bicycle more than four times a month is on the second largest number of students and employee daily frequency (Husin, 2018). This shows there is great potential for improving cycling activities within the campus, due to the academic's habit of daily activities. To build cycling activities in the campus environment, a policy can be done by establishing a cycling activity unit or community.

6 CONCLUSION

The priority factors in improving cycling activities in Sebelas Maret University as follows:

1) Priority I (Main factor to be Improved): Parking space for bicycle, strategic bike parking location for student, night lighting, faculty roles in cycling activities.
2) Priority II (Factors are improved after the main factors): safety for on-campus cycling, safety levels for crossing within campus, street shade for cycling, bike parking safety, pavement conditions for cycling.
3) Priority III (Factors to be improved without best resources): Socialization for on-campus cycling, awards for cyclist on campus, availability of joint cycling activities, faculty roles for cycling activities.

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