

Assessing Students' Perceptions to Sustainability: A Comparison between Two Universities

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ABSTRACT

There has been a rising of international attention in the role of higher education in promoting sustainability. As consequences, several universities have integrated sustainability into their curricula, research, programs, projects, partnerships, and assessments. However, those sustainability programs will never be obtained without cooperation from all stakeholders. Students, as the biggest stakeholders are considered to play an important role in supporting campus sustainability. This research tried to compare the attitudes of students related to campus sustainability in two universities. Five dimensions, i.e., campus sustainability, environmental information, students' sustainability involvement, university's role in sustainable development, and university's self-representation as a green university are used in this research. A case study was conducted in two universities that located in Semarang, Indonesia.

CCS Concepts

• Applied computing → Education

Keywords

Assessment; campus sustainability; students' perspective; sustainability; university.

1. INTRODUCTION

The role of universities nowadays in promoting sustainability has

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ICETT 2019, May 27–29, 2019, Seoul, Republic of Korea.

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ACM ISBN 978-1-4503-7200-8/19/05...\$15.00.

DOI: <https://doi.org/10.1145/3337682.3337683>

outspread over the past decades. This is a result of abundant

declarations and conferences about the need for sustainability in higher education. Since Stockholm Declaration on the Human Environment in 1972 [1] to Torino Declaration on Education and Research for Sustainable and Responsible Development in 2009 [2], the concept of sustainability has been integrated into universities' research, curricula, operations, and partnerships; including its reporting and assessment [3]–[7]. It is expected that universities to engage in sustainability both internally (as an organization) and externally (as agents in their area) [8].

These initiatives should be based on the universities' strategic plans along with their managements' concept of sustainability since the sustainability's concept could be interpreted differently according to the actors that are inferred [9]. To some universities, sustainability is just a matter of master plan, environmental plan, guidelines, or statement about being a sustainable campus [6]; and others create individual institutional policies or framework or tools to achieve campus sustainability, such as ISO 14001 [10]–[13], eco-management and audit scheme [14], environmental impact assessment [15], graphical assessment of sustainability in universities [16], [17] sustainability tracking, assessment and rating system [18], and other frameworks [19], [20].

The sustainability goals will not be achieved without cooperation and participation from all stakeholders, i.e., the students, the faculties and staff, funding agencies, as well as the communities [21], [22]. Students that is considered as the biggest stakeholders, could make a significant impact on sustainability by contributing to and supporting the sustainability of campuses and beyond. Furthermore, they play a critical role in a bottom-up approach to promote awareness across the institution and urge interactions among various stakeholders [23], [24]. However, few studies speak in detail about the involvement of students in supporting campus sustainability [25], [26].

This research aims to identify students' perceptions at two different universities about sustainability practices in their campuses. The research question would be, "Is there any difference between students' perceptions in more green university and less green university?" We come up with a hypothesis that students' perceptions to sustainability in more green university is

higher than in less green university. In order to test the hypothesis, a case study was conducted in University A (as “more green university”) and University B (as “less green university”). University A is labelled so since it is positioned as number two in Indonesia by Universitas Indonesia GreenMetric World University Ranking (GreenMetric), while University B even is not in the list [27]. This GreenMetric is considered as a reputable global sustainability ranking for universities [28], [29].

2. RESEARCH METHOD

To achieve the objective of the research, i.e., to compare the perceptions of students related to campus sustainability, this study employed five dimensions with a total of seventeen attributes [8]. Those five dimensions are campus sustainability (CS) with four attributes, environmental information (EI) with three attributes, students’ sustainability involvement (SS) with three attributes, university’s role in sustainable development (UR) with six attributes, and university’s self-representation as a green university (US) with only one attribute.

The first dimension is campus sustainability, which refers to the ability of the university to support the campus sustainability program. It has four attributes, i.e., (i) university has active environmental student organizations (CS1), (ii) university encourages uses of public transportation or bikes (CS2), (iii) there is a possibility to recycle waste at the university (CS3), and there is a possibility to use one’s own non-disposable cup for coffee (CS4). The second dimension, i.e., environmental information, refers to the possibility of the students to easily access any information related to the environment or sustainability program. This dimension contains three attributes, they are (i) I have read strategic documents of the university and their implementation reports (EI1), (ii) I receive the majority of environmental and sustainability-related information during lectures (EI2), and (iii) University website presents a lot of information regarding university’s position on environmental objectives (EI3). The third dimension, which is sustainability involvement reveals the students’ contributions to support campus sustainability program. It contains three attributes, i.e., (i) I take part in environmental activities organized by the university (SS1), (ii) I take part in social activities organized by the university (SS2), and (iii) I am actively involved in activities at the university (SS3). The fourth dimension UR has six attributes, i.e., (i) University contributes to energy and resource saving (UR1), (ii) University contributes to social well-being, tolerance (e.g., gender, race, religion equality), fulfilment of needs of the disabled, social activities (UR2), (iii) University contributes to environmental education, ecology, environmental activities (UR3), (iv) University cooperates with other national and foreign universities and businesses (UR4), (iv) University contributes to inclusion of sustainability aspects in study programs (UR5), and (vi) University promotes sustainability research (UR6). The last dimension only contains one attributes, i.e., university represents as environ-mentally friendly and clearly declares environmental objectives.

To compare students’ perceptions of two universities related to those four dimensions aforementioned, a t -test was used. A t -test is used for testing hypotheses on the difference in means $\mu_1 - \mu_2$ of two normal distributions where the variances σ^2 are unknown [30]. When the variances are unknown and are replaced by estimates based on the data, the test statistics (under certain conditions) follow a Student’s t distribution. There are two different situations regarding this t -test. First is if it is assumed that the variances of the distributions are equal and second when the variances are

assumed to be not necessarily equal. In this research, we assumed that the variances of two normal distributions are equal.

Suppose that we have two independent normal populations with unknown means μ_1 , μ_2 , and unknown but equal variances $\sigma_1^2 = \sigma_2^2 = \sigma^2$. We wish to test $H_0: \mu_1 = \mu_2$ and $H_1: \mu_1 \neq \mu_2$. Let $X_{11}, X_{12}, \dots, X_{1n_1}$ be a random sample of n_1 observations from the first population and Let $X_{21}, X_{22}, \dots, X_{2n_2}$ be a random sample of n_2 observations from the second population. Let $\bar{X}_1, \bar{X}_2, S_1^2$, and S_2^2 be the sample means and sample variances, respectively. The pooled estimator of σ^2 is defined as follows [30]:

$$S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2}. \quad (1)$$

The quantity:

$$t\text{-value} = \frac{\bar{X}_1 - \bar{X}_2}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \quad (2)$$

has a t distribution with $n_1 + n_2 - 2$ degrees of freedom. The null hypothesis would be rejected if $t\text{-value} > t_{\alpha/2, n_1 + n_2 - 2}$ or $t\text{-value} < -t_{\alpha/2, n_1 + n_2 - 2}$, where $t_{\alpha/2, n_1 + n_2 - 2}$ is percentage point of the t distribution with $\alpha/2$ and $n_1 + n_2 - 2$ degrees of freedom. We can also use p -value to determine whether the null hypothesis is rejected or not; it is when $p\text{-value} < \alpha$, reject the null-hypothesis.

3. RESULT

A survey has been conducted to compare students’ perception of campus sustainability in two different universities. There are University A—labelled as more green university—which is a public university, and University B—labelled as less green university—which is a private university; both of them are located in Semarang, a capital city of Central Java Province, Indonesia. The potential respondents of this survey were firstly approach and asked if they agreed to participate in this survey. If a respondent agreed, he/she will be questioned about his/her perception of campus sustainability based on his/her experience as a student in University A or University B. The respondents then have to answer the questions by choosing 5 Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

There are 77 respondents from University A and 77 respondents from University B who participated in this survey. The percentage of male participants from University A is 32.69% while from University B is 38.91%. From University A and B respectively, there are only 9% and 7% of the participants who are less than 19 years old; 44% and 36% are 19 to 22 years old; 26% and 31% are 23 to 26 years old; and the rests are more than 26 years old. The participants were coming from all type of educations, i.e., vocational study, bachelor (undergraduate), and postgraduate studies. Moreover, in order to give an evenly distributed sample, there had to be representatives in every faculty/school in each university.

The reliability test with Cronbach’s alpha [31] was conducted to verify if the respondents’ answers for any questions tend to relate one and another. To be useful, all of the dimensions must have the value of Cronbach’s alpha more than 0.7 [32]. It is indicated that the questionnaire to be analyzed further is reliable. The Cronbach’s alpha for each dimension as well as mean and standard deviation of each attribute are shown in Table 1.

Table 1. Mean, standard deviation, and Cronbach's alpha values

Dimensions	Mean	Standard Deviation	Cronbach's Alpha
CS			0.756
CS1	2.99	1.06	
CS2	2.41	0.97	
CS3	2.52	1.07	
CS4	2.77	1.18	
EI			0.745
EI1	2.64	1.03	
EI2	2.92	1.21	
EI3	2.82	0.97	
SS			0.767
SS1	2.63	1.13	
SS2	3.02	1.27	
SS3	3.09	2.14	
UR			0.924
UR1	2.94	1.11	
UR2	3.08	1.20	
UR3	3.00	1.18	
UR4	3.28	1.32	
UR5	3.25	1.15	
UR6	3.27	1.27	
US	3.44	0.99	N/A

3.1 Campus Sustainability

Sustainability provisions can be established at the university through the policy and willingness from the faculty. Campus sustainability is one part of the internal practices and activities the universities contribute to sustainability. In term of campus sustainability dimension, from all attributes, University A surpassed University B (see Figure 1). The result revealed that letting students be active at environmental student organizations is the easiest part to achieve at University A, while at University B using one's own non-disposable cup is the easiest part to achieve. Comparing University A and B, results showed that significant differences were observed in three attributes, i.e., CS1 (t -value = 6.091, p -value = 0), CS2 (t -value = 2.375, p -value = 0.020), and CS3 (t -value = 5.428, p -value = 0). However, the fourth attribute, i.e., CS4 was not statistically different (t -value = 1.803, p -value = 0.075). Note that we used $\alpha = 0.05$ and $t_{\alpha/2, n_1 + n_2 - 2} = 2.264$.

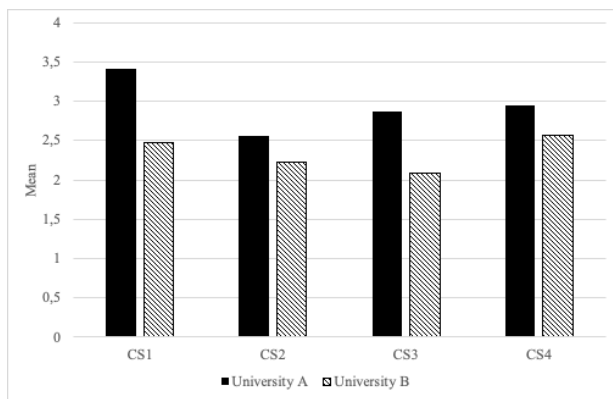


Figure 1. Campus sustainability

3.2 University's Role in Sustainable Development

As has been stated previously, the university plays a very significant role in sustainability provision. The university could "manipulate" students' perceptions related to sustainability and the environment by providing appropriate curricula as well as course plans. The results of the survey showed that again University A had a higher mean value than University B (see Figure 2). Students at University A saw that promoting sustainability research is the most important aspect of a sustainable university. On the other hand, students at University B viewed that including sustainability aspects in study programs is the most important factor. Interestingly, students at both universities agreed that environmental education, ecology, and environmental activities is the least important factor for a sustainable university. All attributes within this dimension are statistically significant: UR1 (t -value = 5.020, p -value = 0), UR2 (t -value = 6.802, p -value = 0), UR3 (t -value = 7.395, p -value = 0), UR4 (t -value = 5.503, p -value = 0), UR5 (t -value = 6.735, p -value = 0), and UR6 (t -value = 8.387, p -value = 0).

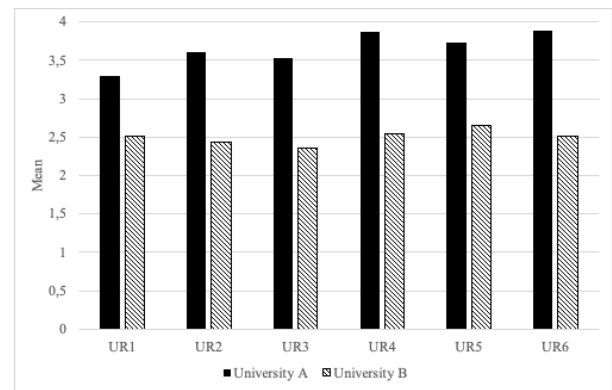


Figure 2. University's role in sustainable development

3.3 Students' Sustainability Involvement

Students of University A perceived that they were more active in taking part in several activities organized by their universities, especially activities related to environment and sustainability issues (see Figure 3). At University A, there are several communities that are engaged in the environmental is-sues. Some of them that could be mentioned here are "Atmosphere", "Environmental Study Group", "Oxygen 16", and "Kesemat." They have several programs such as green competition, youth dialog, and youth in action by "Atmosphere"; tarakura home method composting by "Environmental Study Group"; campus cleaning and composting by "Oxygen 16"; as well as training for creating bio pores and mangrove conservation in Semarang coastal area by "Kesemat. Finally, all attributes within this dimension are statistically significant: SS1 (t -value = 5.193, p -value = 0), SS2 (t -value = 6.789, p -value = 0), and SS3 (t -value = 5.682, p -value = 0).

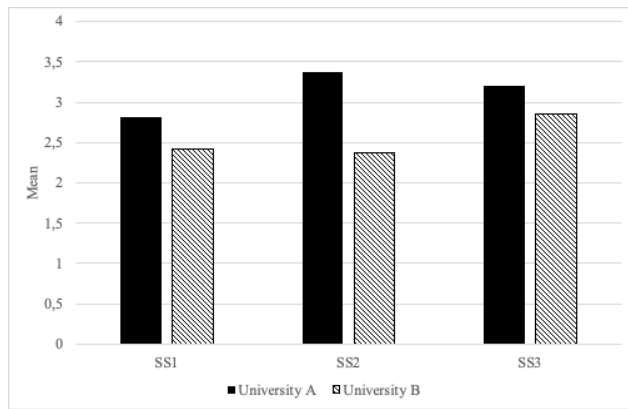


Figure 3. Students' sustainability involvement

3.4 Environmental Information

It is considered essential when the students have to receive information related to both environmental and sustainability-related information and what has been done by their universities related to sustainability programs. Case study results showed that University A also surpassed University B in term of environmental information dimension (see Figure 4). It means that students at University A gain more information about the environment and sustainable development than University B students do during their studies. It is not surprising that all attributes are statistically significant: EI1 (t -value = 2.867, p -value = 0.005), EI2 (t -value = 6.168, p -value = 0), and EI3 (t -value = 6.154, p -value = 0). University B therefore, has to disseminate more information related to the environment as well as its sustainability program so that students could gain more knowledge about the environment. Doing this way, it is expected that the students could be influenced to behave in an environmentally friendly mode.

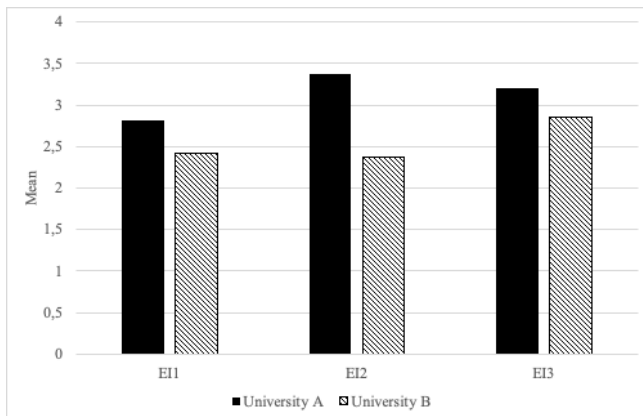


Figure 4. Environmental information

3.5 University's Self-representation as A Green University

Case study result showed that students from University A more often agreed that their university presents itself as environmentally friendly compared to University B students (mean value of University A is 3.85 > mean value of University B 2.92). The result also showed that this dimension is statistically significant (t -value = 6.405, p -value = 0).

4. CONCLUSION

This study tried to compare students' perceptions related to campus sustainability at two universities, i.e., University A—labelled as more green university—and University B—labelled as less green university. Both universities are located in Semarang, a capital city of Central Java Province, Indonesia. This research is motivated by the fact that the students, as the biggest stakeholders of the university play an important role in promoting campus sustainability, and the university could shape their students to have good perceptions towards sustainability. In fact, few studies focused on the involvement of students in supporting sustainability programs managed by the university.

Seventeen attributes from five dimensions [8] are used in this research. The students from those two universities are required to express what they perceive about the performance of their universities according to those seventeen attributes. Results showed that University A surpassed University B in all aspects of those five dimensions. The research question was well answered that there is a difference between students' perceptions in more green university and less green university. T -test also confirmed the research hypothesis that students' perceptions towards sustainability in more green university is higher than in less green university.

As a broader implication, we strongly recommend that to achieve the campus sustainability, the university have to evaluate their policy in terms of escalating the socialization to the students about their sustainability programs so that the students can excitedly participate in the programs. The continuous improvement based on plan-do-check-action has to bear in the faculty's mind to actualize the university to be the sustainable campus.

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