

Green Campus Initiative

(Where do we start?)

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Abstract—Higher education institutions have a distinctive role to foster sustainable development. Universities should prepare their students to become sustainable society members by providing faculty development in sustainability, delivering course programs related with living experiences and theoretical sustainability literacy, as well as performing policy related with Green Campus Act. This study emphasized on portraying lecturers and students of elementary school teacher education program responses regarding green campus initiatives. Online questionnaires were distributed to 12 lecturers and 100 students. Thematic content analysis was carried out to determine the level of higher education institution sustainability. Results showed that the institution has not established the concept of green Campus sustainability, particularly in the area of operational. According to the empirical evidences, it is suggested that the institution should pay more attention to the development of policy of energy consumption and alternative energy resources at the same time, wastewater recycling to provide clean water needs for campus community, and solid waste management, and environmentally friendly-building design. In order to improve academic community's understanding and involvement in developing Green Campus Act, internal house training for the whole community including academic staffs is needed.

Keywords—green campus; elementary teacher education program; prospective teachers

I. INTRODUCTION

Sustainable campus has become an important issue amongst universities around the world [1]. Universities can generate a significant impact to environment. Green Campus is a philosophical and conceptual idea that reflects higher education institutions' green values and strong energy expertise as well as helps to create sustainable solutions to global challenges [2,3].

The concept of the Green Campus develops a new paradigm to solve problems in rethinking their local, national and global environmental culture. One of the Green Campus Programs is to develop an exciting new curriculum that encourages students to create positive change and gain invaluable valuable skills in the environmental field [4]. Green campus initiatives implemented by many universities are taking environmental responsibilities into their accounts, including curriculum development, research, water and energy

saving, and so on [5-7]. Green campus is a program implemented in educational institutions that have an academic system, management, regional order and quality of resources that cannot be separated from the concept of sustainable development [8]. Sustainable development in the idea of green campus is to creating a world where everyone has the opportunity to benefit from quality education and learn the values, behavior and lifestyle needed for a sustainable future as a positive social transition for environmental and cultural preservation [9,10].

In addition to increasing the attitude of environmental awareness, University achievements that meet the criteria for green campus include Student Educators Program, Student Orientation, Student Life, Outreach Materials and Publications, Outreach campaign, Assessing Sustainability culture, Employee Orientation, or Staff Professional Development [11]. Furthermore, there is a brief description of solid waste management, water consumption, energy use, and design mitigation initiatives [12], zero-kilometer food, green product procurement, paperless communications, campus differentiated waste collection points, and water resources saving [13], Environmental Health, as well as air pollution [14-16].

This research aimed at identifying the readiness of the institution in establishing green campus policy. Aspects of energy use (including availability of alternative electrical energy source), water and land use, green area, safety (including building and food safety), waste and wastewater treatment were studied as adopted from STARS Green Campus indicators.

II. METHODS

The study used a survey method to collect data of the institution readiness in establishing green campus policy. The results would then be used as an initial parameter of needs analysis in the frame work on the development of campus sustainability in the term of Green Campus policies.

Target of this research included lecturers and students in elementary school teacher education program. There were 12 lectures (out of 34), 100 prospective elementary teacher students (out of total 783 students) included freshmen, students of the third year and the final year students involved. Research data collection was conducted through the use of Google Form

online questionnaires. Questions list were adapted from Sustainability Tracking, Assessment & Rating System (STARS) Higher Education Institution (HEI) sustainability indicators. The survey covered three aspects: academic, Engagement and Operational aspects. Academic aspects item indicators included curriculum and research sub-aspects. Engagement aspects included campus engagement and public engagement. While operational aspects include weather and climate, buildings, energy, waste treatment, and water consumption. Questionnaires delivered to the students consisted of 54 multiple choice questions whereas lecturers were asked to answer 52 questions.

Analysis of the results was carried out by descriptive statistics to determine the total responses of each item for both groups, percentage of each indicators of campus sustainability in all aspects. Finally, qualitative descriptive explanation of each indicator variable was taken to make general conclusion. Points of weaknesses were also studied for further consideration in establishing Green Campus Initiative.

III. RESULTS AND DISCUSSIONS

Data gathered were then categorised to meet the suitable aspect criterions based on STAR HEI sustainability assessment instruments. Belows are graphs or tables illustrated descriptive analysis data results for all aspects: Academics, Engagement, and Operational along with the discussions in brief.

A. Academic

The first indicator in HEI sustainability is Curriculum. As Fig.1 showed, both students and lecturers mentioned the existence of ESD/environmental education course in the study program. Yet, less students stated their attendance in this course because they were freshmen students. environmental Education subject is taught in the second year, so it is obvious that only senior students answered correspondingly.

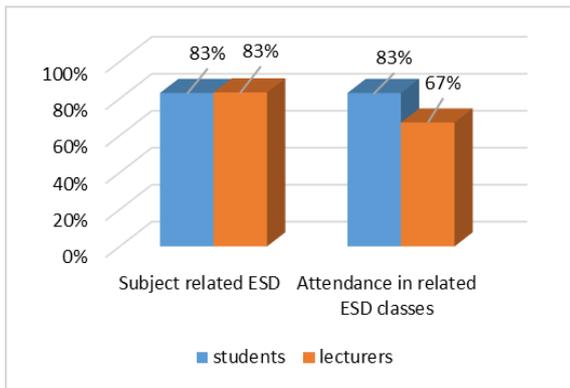


Fig. 1. Students' and Lecturers' responses about the existence of ESD related subjects and attendance in ESD related lectures.

Green campus concept is also once translated into the action of less paper use. This is potentially occurred in the process of learning which involves ICT in its classroom practice. Instead of using rims of papers, both lecturers and students could replaced hard-file assignment or exam collection with online moodle, emails, or other learning management system (e.g SPOT for the institution context).

Data related with this finding is showed in Fig. 2. This fact also fitted with previous research in which curriculum improvement was one of the major attention in achieveng campus sustainability by the integration of ESD related subjects in university practice [5,6,8,17].

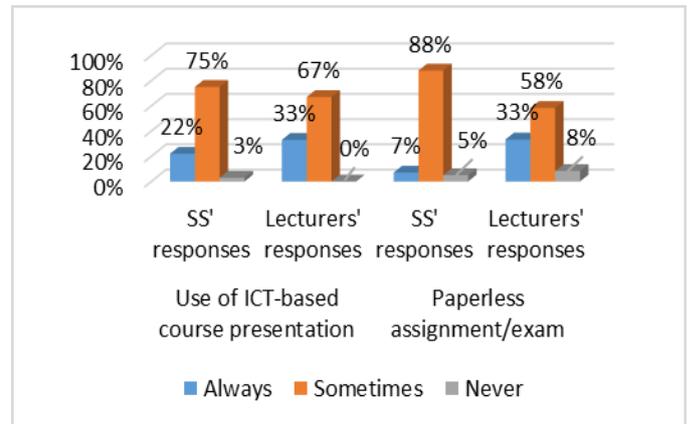


Fig. 2. Students' and lecturers' responses regarding paperless presentation and/or assignments.

According to the picture, it can be seen that the utilization of ICT in lectures only occurred in certain courses. Around one third of the lectures still deployed traditional mode of non-ICT based learning. This is also relevant with the use of paperless idea during assignment or take-home exams answers collection. Further waste management may involve recycling.

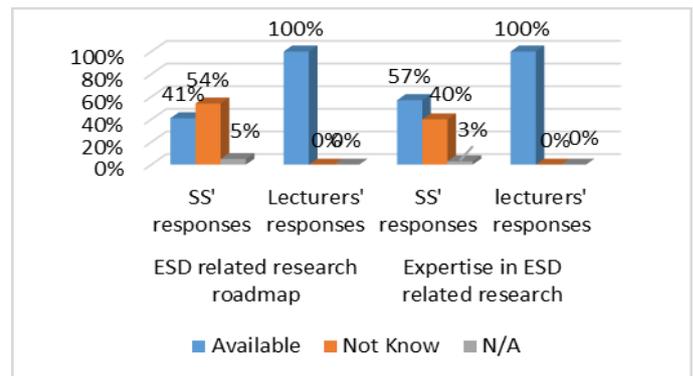


Fig. 3. Students' and Lecturers' responses on the availability of research roadmap and expertise(s) in ESD related study.

Fig 3. Illustrates a gap between students and lecturers understanding of the relevant ESD/environmental research roadmap. For example, in Science Education roadmap, there is a topic of ecopedagogy research went along with the ESD/environmental study area. This empirical recorded data supports assumption that socialization of research towards students and public would help higher education institution in improving the implementation of Green Campus. Research related with the theme of ESD/environmental study in the elementary teacher study program was established in expertise group consisted of lecturers with relevant academic background.

Proposed finding was also identified in misrecognizing potential expertise of lecturers in the field. Among 34 lecturers

in the program department, one holds Doctoral Degree from Environmental Education Department. Additionally, four other lecturers have been conducting relevant research in the field, and one lecturer wrote undergraduate thesis in environmental-chemistry study on industrial wastewater treatment. Moreover, students expressed low understanding on the availability of research roadmap in particular topics of ESD.

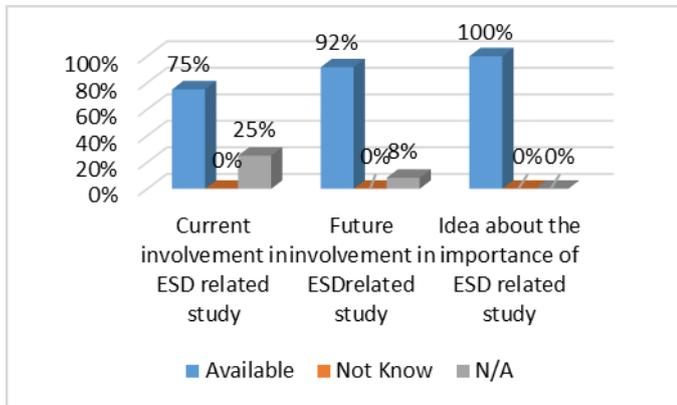


Fig. 4. Lecturers' responses about involvement and importance of ESD related research.

Distinctive features can be seen obviously regarding the involvement of lecturers and students in ESD/environmental research related theme, by contradicting illustration on Fig 4 and 5. Over 75% respondents from both group viewed the importance of this area of research which is also showed in the percentage of their future involvement plan in the field. Nevertheless, number of students' prior participation in seminar/workshops is higher than in community services.

B. Engagement

TABLE I. RESPONSES OF STUDENTS AND LECTURERS REGARDING CAMPUS ENGAGEMENT

Indicators of campus engagement	Responses	students	lecturers
Posters telling about taking care of the campus environment	Yes, almost in all areas	14%	42%
	Yes, only in certain places	72%	58%
	None	14%	0%
Participation in seminar/workshop related w' ESD/environment	Yes, as participant	67%	58%
	Yes, as presenter	0%	17%
	Never	33%	25%
Campus Spring Clean	Yes, routine	3%	25%
	Yes, sometimes	22%	50%
	Never	75%	25%
Number availability of janitor(s)	Enough in amount	66%	58%
	Not enough in amount	34%	42%

According to table 1, we can say that campus still needs to work on faculty development through seminar, workshops or trainings programs to increase participation number of both lecturers and students, particularly as presenters not only participants. In line with this, participation of all academic community in routine spring clean action which involves

students and lecturers is also a point of attention. This routine activity is an alternative solution to the limited number of janitors dealing with campus hygiene and sanitation, which was considered to be insufficient to establish a healthier and greener campus environment.

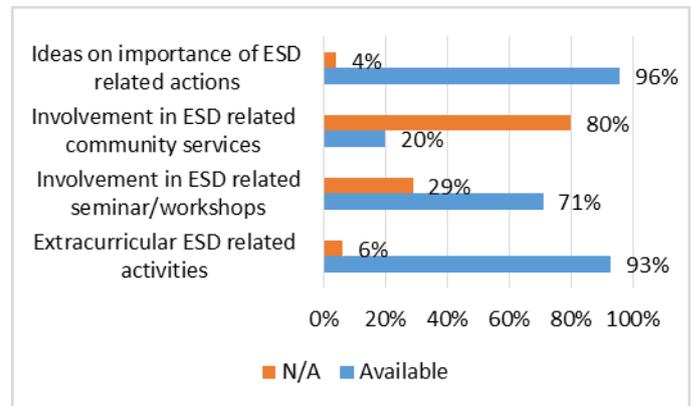


Fig. 5. Student organizations' involvement in community services related with ESD actions.

In accordance with the explanation above, persuasive efforts for all campus citizens should be increased to develop people awareness to always keep the environment clean and healthy. This evidence is in line with previous study result suggested that academic community engagement had a vital role in the campus sustainability improvement [18]. Visual aids like posters or slogan stickers are considered to be effectively helpful if placed in strategic places in campus.

TABLE II. RESPONSES OF PUBLIC ENGAGEMENT SUSTAINABILITY INDICATORS

Indicators of Public Engagement	Responses	Students	Lecturers
Campus CSR themed ESD/environment	Yes	67%	92%
	No	33%	8%
Involvement in Campus CSR themed ESD/environment	Yes	33%	58%
	No	67%	42%
Involvement in Campus CSR themed ESD/environment	Yes, as participant	33%	50%
	Yes, as presenter	0%	17%
	Never	67%	25%
	N/A	0%	8%

Data expressed in the table mentioned that the faculty had held relevant Campus Social Responsibility (CSR) initiatives for public. For example, routine CSR has been implemented from 2016-2018 to help people in distant urban district area called Legok Pego, in Bandung, West Java, to improve their quality of education and health. The action itself consisted of two interrelated activities which involve all campus members in various charity events. Yet, the level of participations of the lecturers and students needs an improvement.

C. Operational

This part consisted of results and explanation to all indicators that are described in details as follows. As showed in

Figure 6, it is clear that although campus is located in an area that is quite away from industrial residences or traffic, the quality of air surrounding was not good enough as mentioned by the lecturers. One of the reasons was smoking area absentness. Air pollution from smoking were found at canteen, sometimes also found in the working space, or in the yard and parking lots.

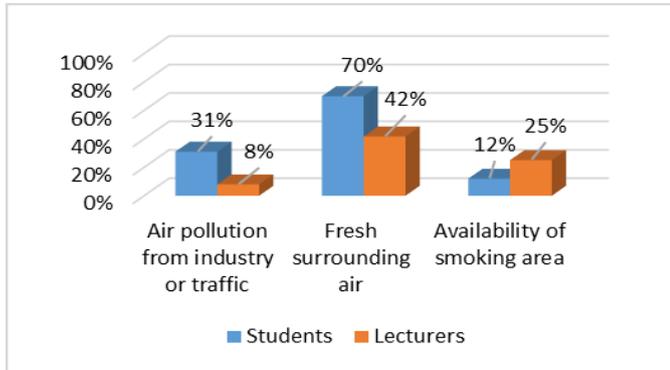


Fig. 6. Students' and lecturers' responses about the quality of air surrounds the campus area.

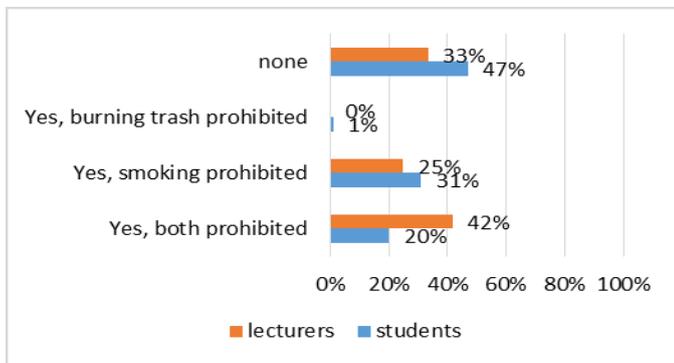


Fig. 7. Students' and lecturers' responses about the policy regarding smoking and burning trash in campus area.

As we can see from the diagram, students considered smoking prohibition is not strict. It is proved as limited warning signs found in the campus surroundings. Similarly, unwritten rule to smoke in the campus area was mentioned orally by lecturers. In canteen, green area, toilets, and even office rooms, smoking activities were found. So, there is a need to design a smoking area quite away from academic facility and a policy on smoking.

Next, Fig.8 data showed conflicting ideas about orientation of planting potted plants inside the building. Lecturers considered that it was mainly for aesthetics, yet students believed that Xansiviera or Aglaonema were quite effective to clear away air pollution.

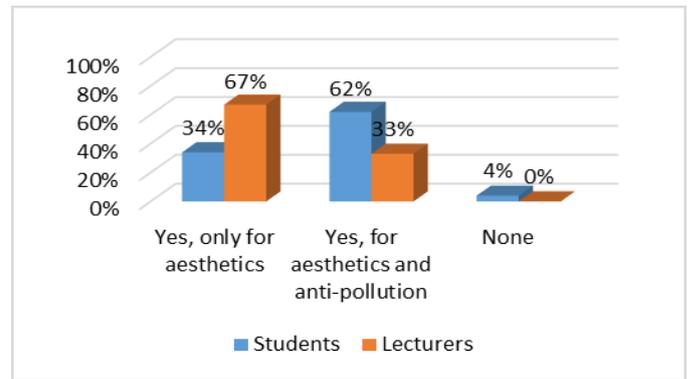


Fig. 8. Students' and Lecturers' responses about growing potted plants in the campus building.

Figure 9 depicted the limited knowledge about green building concept design of both groups. Nevertheless, empirical data revealed that the buildings (classroom, labs, and office) were designed environmentally friendly since natural air flow system dominated the air-cooling systems rather than the use of air conditioner (AC) (Fig 11 and 12).

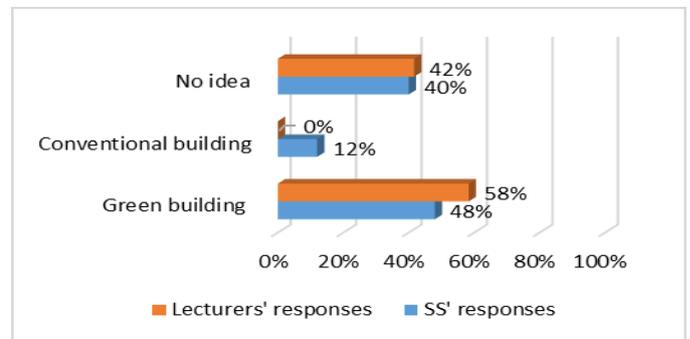


Fig. 9. Students' and Lecturers' ideas about campus building.

Concept of green campus building as a criteria for sustainable university is elaborated in the design of air flow system [18], thermal insulation, cooling system, roofing design, lighting system, safety, and also interrelated with further energy use [19]. Corresponding findings showed that classrooms, labs, and office design provided a good heat-insulation system which support energy efficiency cost [18]. Almost all rooms provided were spacious with lots of windows opened for facilitating students and lecturers with comfortable air-flow to maintain temperature and freshness during activities.

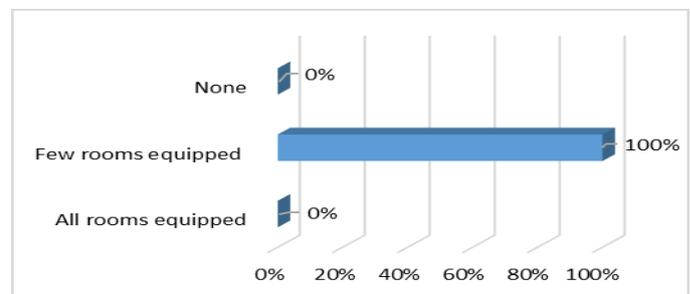


Fig. 10. AC availability in each room.

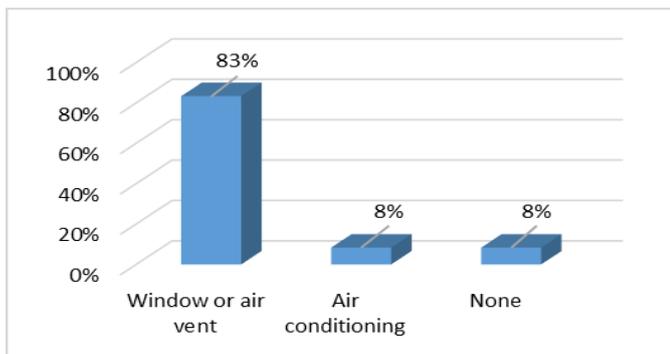


Fig. 11. Campus inhabitants' responses about air flow system in buildings.

Responses expressed in Table 3 revealed that on average, either students and lecturers spent >5 hours a day at campus. This situation implied on electrical appliances use time which showed higher energy consumption for lecturers than students. This is obvious because in building office, more electrical appliances are provided. Yet, in student centre building, only few electric appliances used, such as printer and light bulbs. Disappointingly, more than 50% light bulbs used in all rooms were not energy-saving lamps, which caused a monthly high-cost electricity bill. Additionally, there was no policy regarding energy saving. Moreover, alternative energy utilization like solar or wind had not been developed at all. The availability of open backyard area support its potential.

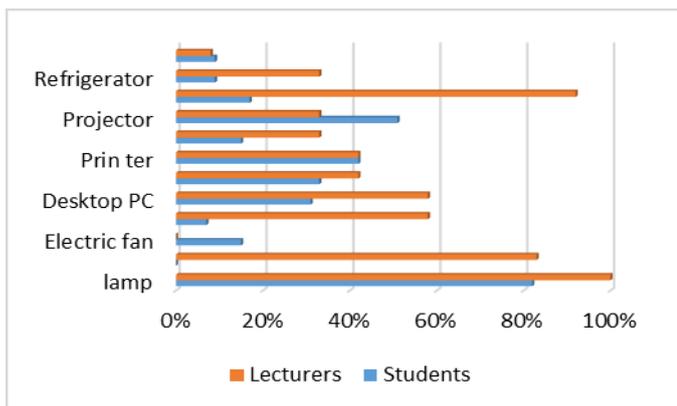


Fig. 12. Types of electrical appliances present in all rooms.

Data in Table 4 expressed that campus had provided adequate numbers of separated trash bins along with its use guide. Unfortunately, further solid waste management system is no longer supported. Respondents described there was almost no policy on littering in the campus area.

In general, solid waste is collected from each separated trash bin, but surprisingly was then recollected together again and was sent into open dumping area and ended up burnt altogether, not in incinerator. This also went with domestic organic waste from canteen, which make the separated-waste bins method became useless. In addition, the technique produces air pollution to the environment. Potential to recycling trash was still limited, that is by recycling paper method, which was quite abundant in volume resulted from routine use. A more effective waste management system plan is

expected to improve water, air, and land quality which contributes to better health level of campus citizens [12,13].

TABLE III. RESPONSES RELATED WITH ENERGY USE

Indicators of energy use assessment	Responses	students	lecturers
Average time campus stay	<2 hrs	0%	8%
	2-5 hrs	30%	8%
	>5 hrs	70%	83%
Utilization time for electrical appliances	Turned on all the time	0%	0%
	turned on during campus stay	14%	42%
	Turned on only if needed	85%	58%
Campus policy about energy use	Always turned off	1%	0%
	Yes	43%	58%
Availability of alternative energy resources	None	57%	42%
	Yes, solar panel or others	0%	0%
	None	97%	100%
Energy saving lightings	Others	3%	0%
	Yes	47%	33%
	None	50%	67%

TABLE IV. SOLID WASTE MANAGEMENT SYSTEM

Indicators	Responses	Students	Lecturers
Availability of separated organic, nonorganic, and harmful waste trash bins	Yes, in enough amount	90%	100%
	Yes, not in enough amount	4%	0%
	Not separated	5%	0%
Explanation regarding different types of litter	Yes, put near each bin	55%	50%
	Yes, put only in certain places	29%	17%
	None	15%	33%
Campus punishment policy about littering	available	20%	8%
	None	77%	92%
Solid waste management system (includes trash from canteen or pantry)	open dumping without separation	58%	34%
	open dumping with separation	17%	32%
	Throw away into streams	0%	0%
	Composted	4%	8%
	Burnt down without separated	8%	22%
	Burnt down with separation	25%	0%
	put into landfill	0%	3%
	Fed to animals	2%	0%
	partially recycled	8%	11%
	Reused	8%	5%

Table 5 described how campus provided water for its community and its use. Ground water was the main source of water supply. Surprisingly, students lacked knowledge about the source of the water they use. Almost half of the students mentioned that the water came from communal water service. Unfortunately, the properties of water were not suitable for drinking use as it was not fresh and in some areas like students'

restrooms, the water is not clean because of the suspended solid from soil run-off, especially in rainy season. As seen in the table, there was insufficient water tank keeping to provide people with enough water particularly in dry season. On the other hand, there was plenty of water infiltration surface area around campus which have not been effectively used and should be considered in the policy.

TABLE V. WATER USE

Indicators	responses	Students	Lecturers
Clean water resource	Communal water service	49%	8%
	ground water	45%	92%
	Recycled water	1%	0%
	Rainwater	0%	0%
Quality of water provided	Clean and fresh	47%	50%
	Clean but not fresh	22%	42%
	Turbid and smelly	27%	8%
Drinking water potential use	Drinking water potential use	12%	17%
	Not potential for drinking use	86%	83%
Water tank keeping	Available	21%	25%
	None	76%	75%
Water infiltration surface area	Available	77%	83%
	None	23%	17%

Fresh and clean water resources is one of the main needs of campus inhabitants. In other word, sufficient consumption and sustainable use of fresh water natural resources should be campus community’s main concern in establishing a strong foundation of Green Campus Movement [6,7,12].

IV. CONCLUSIONS

Based on data analysis results, the research conclude that campus sustainability movement was not yet developed in the study program. The design of green campus initiative should then be commenced with the improvement of efficient energy consumption (by the use of alternative energy resources), preservation of water resources (e.g. recycling of used water), policy of low-cost energy use, the improvement of faculty awareness through CSR and routine environmental actions which involve all community members, including staffs.

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