

Student Perception of Waste Management in Petra Christian University as a Green Campus

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ABSTRACT

The development of green building issue that refers to environmental friendly building has significant impact around the world, as it is in Indonesia. Petra Christian University responded that issue by starting the green campus movement since 2010. The goal of this movement is to engage all students to be more care about environmental sustainability including waste management. The aim of this study is to determine the students' perception about the waste management in Petra Christian University. In order to understand students' perception toward the waste management, a questionnaire was used. The result of this study is waste management need to be improved as about 40% of the respondents indicate that they do not know about the waste management in Petra Christian University.

Keyword: students' perception, waste management, green campus

I. INTRODUCTION

Recent years there have been many issues about green building and green campus. Green building, according to Mohd Reza bin Esa can be defined as a building that use key resources like, energy, water, materials, and land more efficient than non-green buildings.

Based on Kats (2003), green buildings have effects to environment, resources consumption, impacts to the users, financial impact, and impact to the world at whole.

The Green Building Council Indonesia (GBCI) is a green building council in Indonesia. GBCI which has been established since 2009 focuses on education in the application of green building concepts.

In an effort to respond to the issue of the concept of green buildings, Petra Christian University has claimed to be a Green Campus since 2010. This plan is a proof of care to environment. In the green campus program, according to Ir. Jimmy N. K. Priatman, M. Arch at least there are five parameters, which is electricity, water, effective land usage, maintain the quality of environment, and recycle of waste also building materials. There is one of the five parameters that involve student's action for it to happen, which is waste management.

Variety sorting is applied in waste management program. The sorting is divided in three groups, which is paper, plastic, and organic. It is done to ease the next process of waste management. In reality, the sorting of the wastes is not running optimally because of some factors, whether is the facilities or the people's involved perception of waste management.

The people involved are not always students or lecturers, but it is also the campus' janitors. However, from the parties involved, student's role is the biggest. This is

considering the number of the students reach 8000 people. The amount of waste is proportional to the number of the students. Thus, it is very important to know how far the perception of the students about the waste management in Petra Christian University.

In the end, the implementation of the waste management depends on the students' perception about waste management. For that, an experiment is conducted to know how far the perception of students about waste management in Petra Christian University.

I. METHODOLOGY

The research has been done in several steps. The first step is the collection of literature reviews which has been done in the same time with the making of questionnaire. The second step is to share the questionnaire to the respondents, who are students of architecture department. the third step is take the interview with the head of waste management process. The fourth step is to observe how student in daily activity throw the waste in campus. The last step is to analyse the data.

II. LITERATURE REVIEW

Now days green architecture it is not only about new concept in the building but it become basic standard in every building. This concept will not be able to do if only depend on the system, every occupant must work together to make green building system able to do, for example students.



Figure 3.1 Perception Pyramid

(<https://www.flickr.com/photos/7855449@N02/2963836983>)

From the Figure 3.1, it explain about how what people think will impact to what people do, so how students think about sustainable architecture concepts and green building architecture can be seen with how students do to act for this concept and movement.

There are many *Sustainable Architecture* concepts that have been communicated by various parties. Perhaps, the most important is by UIA (*Union Internationale Architectes*) in Copenhagen December 7, 2009.

Sustainable and eco-friendly architecture is one of the main aims of human life. For this reason, moving towards a greener architecture is well-thought-out the main goal of the present architecture of our time (Mahdavinejad, 2014). Sustainable architecture also known as Green Architecture produce environmental, social, and economics benefit (Ragheb et al, 2015). Green Architecture is an approach to building that minimizes harmful effects on human health and the environment (Roy, 2008).

Indonesia also has its own Green Building Council, called GBCI (Green Building Council Indonesia). That has been established since 2009. GBCI sets a rating system called *GREENSHIP*. In this *GREENSHIP* system use a credit system to determine the assessment for green building in Indonesia. GBCI has an indicator rating tools to help take scoring for green building it called Greenship rating tools and it have 2 kind of rating tools, for existing building and new building. There are so many points that should completed such as :

- Appropriate site development
- Energy efficiency and conservation
- Water conservation
- Material resources and cycle
- Indoor health and comfort
- Building environment management

In point material resources and cycle there is sub-point called waste management policy to explain about the building must have a statement about management policies regulating waste management based on segregation between :(2011, GBCI)

1. Organic waste = waste produced from biological materials that can be degraded by microbes.(2008, Artiningsih)
2. Inorganic waste = waste produced from non-biological materials, in the form of synthetic products, the results of the processing process of mining materials. (2008, Artiningsih)

3. Hazardous waste

Also it must have campaign on every floor about this statement; the media can be poster, sticker, and email. Another sub-point, also explaining about waste management practice and have 5 criteria :(2011, GBCI)

1. To operating procedures, training, and reports to collect and sort of waste based on organic and inorganic types
2. Available of organic waste processing independently or in cooperation with official agencies
3. Available of inorganic waste processing independently or in cooperation with official agencies who has principle 3R (reduce, reuse, and recycle)
4. Effort of packaging waste reduction which made from Styrofoam and non food grade plastic.
5. An effort for dealing with waste from renovation activity to a third party at least 10% from the total renovation budget

One if the characteristics of a green building is “minimal harm to the natural habitat”, which is one of the aspect is about waste management.

Based on the Indonesian Law (UU) No. 18 of 2008 concerning waste management, waste can be defined as the remaining daily human activities or natural processes in the form of solid or semi-solid in the form of organic or inorganic substances that can be decomposed or non-biodegradable which are considered no longer useful and discarded in the environment. Before the waste discarded to the environment, it must be processed in the Integrated Waste Processing Site (TPST), and so it is safe for humans and the environment.

If it is viewed from its physical nature, according to Artiningsih (2008), waste is grouped into two, namely :

- Wet rubbish, is the remainder of processing or food scraps from the household or is the generation of leftovers, such as vegetables.
- Dry waste, grouped into two types:
 - Non-weathered waste groups, which cannot be decayed naturally, even for years, for example glass and mica.
 - Not easily decayed waste; this type of waste will decay slowly in nature.

III. ANALYSIS

One solution to start green campus movement is to start from small thing such as to manage small waste from the determination of the community itself. From this awareness about waste management is expected to form a better environment, which is expected to improve building user's quality of life.

According to the data taken from the architecture students of Petra Christian University, it is found as:

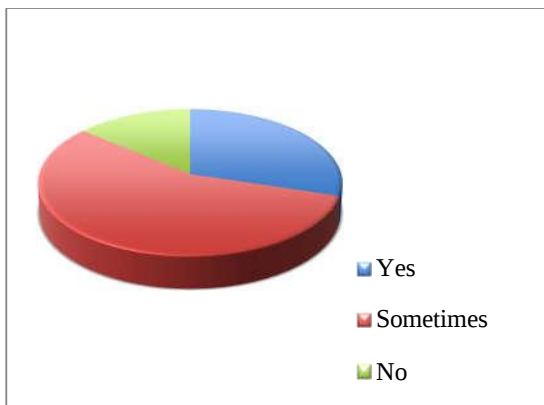


Table 3.1 Questionnaire result regarding waste sorting

From table 3.1 we know that 57% of the students sometimes sort the waste, and 14% don't. Quite a lot of students are aware of the importance of sorting the waste, which is 30% of them.

The 14% of all can be affected by their perception and knowledge about the importance of the intention of waste management.

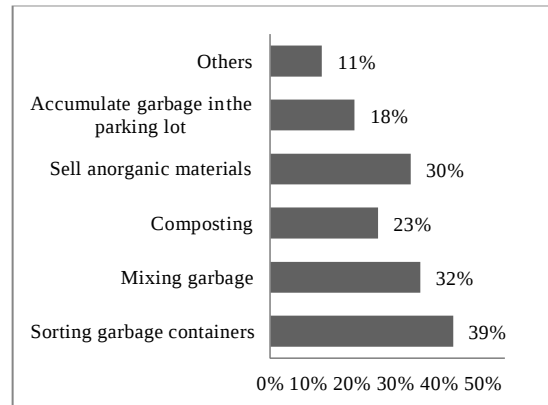


Table 3.2 Questionnaire result regarding the students' understanding about the final waste processing

From table 3.2, 32% of the students have perception that at the end the waste that have been separated based on the types; plastic, paper and cans, and organic at the end will be mixed into one. This resulted in the laziness of the students to sort the waste, because they know that in the end the waste will be mixed into one. The problem isn't only about the laziness students to sort the waste, but the trash bin facility inadequate. Some of the trash bin symbol/logo to differentiate between organic wastes, plastic and can waste, and paper waste were lost and some of them corrupted. Not only there, but we found there is a trash bin without waste sorting symbol or logo. This condition make students don't want to sort their waste before throw it to trash bin because they don't know which trash bin for organic waste, plastic is and can waste, and waste. Because all of it, it make every waste not sorted and it dropped and mix in one trash bin. This mixed waste make it hard to recycle or reuse because some trash in the certain condition it easily to decomposed. For example paper waste from architecture design studio class which is it easily to recycle or reuse but if it waste in trash bin which is mix in with organic waste it will be easily to decomposed, and it cannot recycle as it should be, to be a paper again. Not only that decomposed waste without human control is dangerous for environment because it make bad bacteria and microorganisms easily to bloom, which is can threat the human health who live near that container. Not only about inadequate trash bin, are some poster to campaign about environmentally friendly to reach green building inadequate. So it is be hard to read and make people not interested to read. This condition make the message to campaign about environmentally friendly to reach green building is not delivered to people.



Figure 3.1 Main waste container mix all waste categories



Figure 3.1 Trash bin with corrupt waste sorting symbol or logo



Figure 3.2 Trash bin without waste sorting symbol or logo and laziness of student to sort the waste

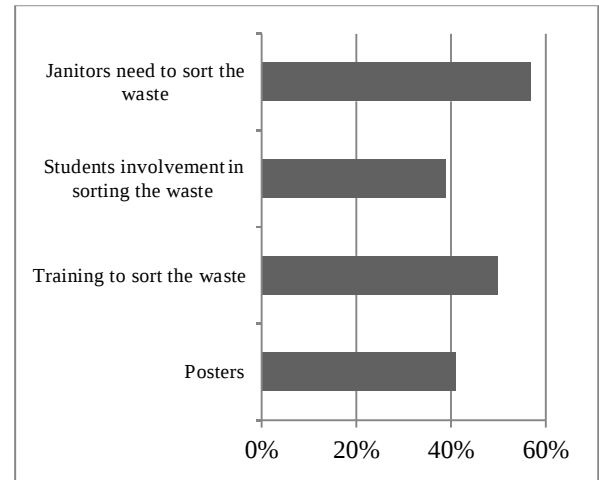


Table 3.3 Questionnaire results regarding solutions to encourage students to sort the waste

The biggest percentage; 39%; has another perception, that in the end the waste is still sorted by the janitor. This perception appears as result of their perception that waste finally will be mixed in main trash bin. This perception appears as result of activity whose janitor has done. They collect and mix all waste from building then throw it to main trash bin. They do like that because all of the waste in the building was mixed. One step of which is its need to make a different container to collect different waste. So from this expected it can help the janitor to sort the waste and if see the result expected student can more aware about waste sorting.

Not only make a different container, but every container must be have different treatment, so the waste can be recycle or reuse as it should be. For example, paper waste container cannot put in outdoor because it will make paper can't recycle or reuse. If the paper waste is still in good condition (not degraded), it can be reused or recycled easily. With this condition expect student want to take a part to sort the waste because they can reuse or recycle paper if they need it.

The second highest is the solution that students need to be trained about the waste sorting. This is very different from the results of previous data. The third position is to use posters or pamphlets to make students aware about waste sorting. The last position is the students' involvement in sorting the waste. Of the four solutions, all are needed by the students, from the posters and pamphlets that remind students when they are doing their activities.

Training for all the students and janitors need to be routines for all the community so that they have the same perception and are willing to manage the waste. In this era, students tend to learn practical things than theories, and then training can be started for the student so that they may learn about waste management.

Socialization about waste management must be known by students. Petra Christian University has already have waste management for organic waste and it became fertilizer plants that will be shared to the society and used in Petra's garden..



Figure 3.3 Fertilizer plants that produce by Petra Christian University



Figure 3.4 The main ingredient of fertilizer plant

This fertilizer plants are made from dried leaves that collected from surroundings, mixed with leftover student's food from canteen, yakult, yeast, and water. This process usually takes 1 month to make it better. Before this process there are many steps, such as

1. All wasted organic and inorganic things collected in a big trash bin
2. The big trash bin is being sent to the place of waste treatment
3. Starting to sort the waste
4. The organic waste is then ground by a grinding machine.
5. Thus, the grounded waste is being mixed with solid fertilizer and the liquid one (*probiotic*).

6. The result is being settled in a proper air circulated room
7. The product is being stirred every two days to ensure the bacteria spread evenly.
8. The step continued in two months, then the product is ready to be sieved in sift machine
9. Finally, the product is ready to be used.

This process can be faster if students help to sorting well the waste in the trash bin



Figure 3.5 Plastic and cans trash bin filled with another waste type

From this picture it shows that student still not put the trash in the right place although there are already many poster and banner in Petra Christian University

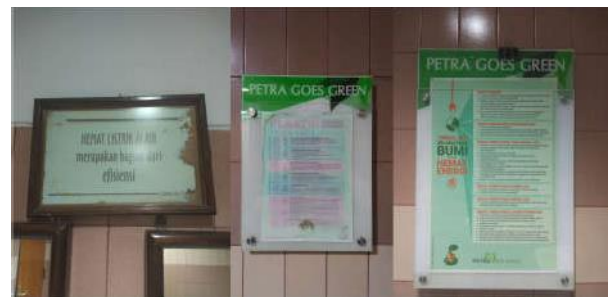


Figure 3.7 Poster in Petra Christian University to campaign about green building

While Petra Christian University had already many of these posters, not all of them are really helping people to remind the importance of the green building concept. As we can see in Figure 3.7, not all of them are readable; all of them need to be replaced once in a while to preserve the readable condition of the information from the posters.

There are already many things have been done in Petra Christian University to ensure the green building concept is in motion. Starting from the existence of composting house, separation of the waste container, posters

Students' perception is built through the lack of information to the students, so that they may thought that all the waste is in the end mixed and just being thrown away just like that.

The second possibility is the students are too lazy to separate the waste when they throw it to the container.

IV. CONCLUSION

Petra Christian University already built a system for a realization of green building concept with waste management. According to the data, students' perception that impact to students' behaviour is not complement with the theory. This happens because of students' lack of information and socialization about waste management, these made student do not care anymore about environment. Another factor is the cleaning outsourcing did not trained very well about this waste management and often to put together the organic and inorganic waste.

Through the GREENSHIP system we know that Petra Christian University is a green building that has its own waste management system. It needs people for the waste management system to be in motion. And that is the importance of the perception. Students' perception must be corrected for the beginning.

In the end, the green building concept can't be in motion without the user behaviour. The user must be trained to be able to understand and apply the theories to the reality among us as simple as to separate the waste. To accommodate that, preservation of the information about waste management needs to be done, starting from the

poster and container label. Another start that can be made is the training of students and university members.

It is all done to build the new students' perception about the waste management in Petra Christian University. The building of students' perception is to support and increase the existing building to be a green building.

V. REFERENCE

- [1] A. Ragheb, H. El-Shimy, G. Ragheb. "Green architecture a concept of sustainability". *Elsevier*. 2015.
- [2] G. Tanuwidjaja, A. Budhiyanto. "Persepsi mahasiswa uk petra terhadap perpustakaan yang nyaman dan hijau". Department of Architecture, Petra Christian University. 2018. Unpublished.
- [3] "Bangun Green Building, Universitas Petra Siapkan Rp 200 M". *BeritaSatu*. Web. 17 August. 2018.
- [4] Undang-undang no. 18 tahun 2008 tentang pengelolaan sampah. (n.d). Jakarta.
- [5] N.K.A. Artiningsih. "Peran Serta Masyarakat dalam Pengelolaan Sampah Rumah Tangga (Studi Kasus di Sampangan dan Jomblang, Kota Semarang)". Department of Environmental Science, Diponegoro University. 2008. Published
- [6] Green Building Council . " Greenship Existing Building version 1.0 Benchmark summary". Rating and technologies division, Green Building Council Indonesia. Januar

