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The Optimization Strategies of Student Knowledge and Behavior in Plastic Waste Management of Semarang State University

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Abstract

The objective of this paper is to analyze the strategies that have been carried out by UNNES on student knowledge understanding and behavior in plastic waste management and prioritize optimization strategies of student knowledge and behavior in plastic waste management in the Semarang State University environment. This research was designed descriptively by using a qualitative analysis approach using key persons consisting of Head of the UPT BANGVASI UNNES, Head of the UNNES Household Section, Academics who are experts in the conservation field, and UNNES students. Furthermore, the analytical tool used to determine the optimization strategy in this research used the Analytical Hierarchy Process (AHP). The location of this research was on the Semarang State University Campus, which consists of the Sekaran Campus and the UNNES Postgraduate Program Campus. The results of the research showed that (1) The first criteria that are most prioritized in the strategy to optimize student knowledge and behavior in plastic waste management are facilities and infrastructure with a weight value of 45.8% or 0.458; (2) The second priority criterion is HR with a weight value of 41.6% or 0.416; (3) The last strategic priority criterion is policy criterion with a value of 12% or 0.126.

INTRODUCTION

Environmental problems amid a very rapid population growth rate definitely impact the increase in environmental pollution which occurs on the surface of the earth. In fact, this is not in line with the targets set by the SDGs (Sustainable Development Goals), that by 2030 every country can substantially reduce the heap of garbage through prevention, reduction, and reuse (Panduan SDGs, 2016).

One of the countries that is still struggling to combat the waste problem is Indonesia. Environmental problems related to the SDGs target are related to the pattern of production and consumption, which is very closely related to the amount of waste generated every day. Based on the data obtained from the Ministry of Environment (KLH), the waste generated by Indonesian residents every day is 0.8 kg of waste per person or a total of 189 thousand tons of waste per day. Of the total waste, as much as 15%, or if calculated at 28.4 thousand tons are in the form of plastic waste per day (Pahlevi, 2012).

One of the big cities, which is the largest waste producer in Java Island is Semarang City as much as 5,163.72 m^3 per day (BPS, 2018). The waste comes from the remnants of public consumption which cannot be managed properly. Another factor that causes a higher increase in waste is the socio-economic factor, because the higher the income of the community, the more per capita the amount of waste that is thrown away due to their increasing consumption activities (Slamet, 2009).

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Universitas Negeri Semarang (UNNES) is one of the higher education institutions located in Semarang City and also has potential as a waste contributor both organic and inorganic waste. The type of waste that is still a lot produced by UNNES is the use of plastic in the campus environment which is increasing day by day, especially in the canteens in each faculty and food stalls around the campus environment (Setyowati, 2014).

The development of UNNES from year to year continues to experience changes and development both structurally and functionally. The addition of the name and number of faculty will also affect the number of the academic community, namely students, educators, lecturers, and staff. The ratio of the number of students and lecturers of UNNES based on each faculty in 2020 can be viewed through the graph as follows.

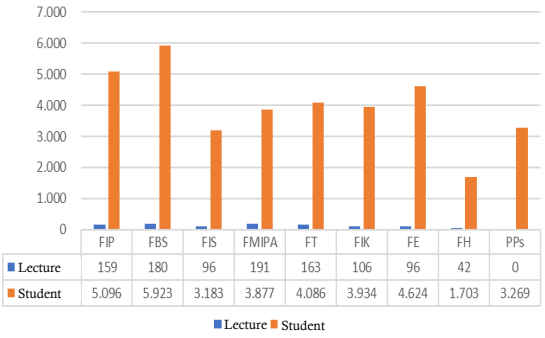

Figure 1. Ratio of the Number of Lecturers and Students UNNES Year 2020.

In its development, UNNES has declared itself as a Conservation University as a way to contribute to environmental management in order to enter the ranks of a world-class university (Yunitasari, 2016:51). The identity of UNNES as a conservation-minded campus must also be supported by the behavior of students, one of which is in the process of managing plastic waste. Various training and counseling have been attempted by the campus in order to realize its determination to maintain the values of conservation held by UNNES to its students. Most of these programs certainly can improve students' knowledge but not on their behavior in applying conservation values, especially in the process of waste management. It is in line with the research conducted by (Prayitno, 2016), which states that UNNES student knowledge of conservation programs is in a good category. Meanwhile, student behavior towards the conservation program is in the less good category, namely the implementation in terms of caring for plants, picking up scattered garbage, utilizing used paper, and participating in campus waste management activities.

Having a high level of knowledge but not having good behavior towards the waste management process is a problem that still has not got the best solution at the State University Semarang campus. Various policies and efforts have been attempted to be carried out but there has been not the right strategy in handling the problem. Based on the background described above, it is very important to conduct a study regarding the optimization strategy of student knowledge and behavior in the management of plastic waste. This study aims to know and prioritize the strategy to optimize student knowledge and behavior in the management of plastic waste in the State University Semarang environment.

METHODS

This research was a descriptive study designed by using a qualitative analysis approach. The location in this study was the Semarang State University Campus located in Sekaran and the Postgraduate Campus located on Jalan Kelud Utara. The focus of this research was on the analysis of prioritizing optimization strategies of student knowledge and behavior in the management of plastic waste.

This study used data sources, namely primary data and secondary data. The primary data were obtained by using informants (key persons) consisting of the Head of UPT BANGVASI UNNES, the Head of Household Section UNNES, Academics who are experts in the conservation field, and UNNES students. Meanwhile, secondary data were obtained from relevant literature and support research data.

Furthermore, the analytical tool used to process and formulate optimization strategies in this research was Analytical Hierarchy Process (AHP). The components of the AHP analysis used in this study consisted of several criteria and alternatives obtained based on literature studies, observations, and interviews with selected key people who have expertise in line with this research, namely conservation and waste management.

RESULTS AND DISCUSSIONS

Semarang State University is located in Sekaran Village, Gunungpati Subistrict, Semarang City. Astronomically, it is located at coordinates

70^0 03' 09'' South Latitude- 70^0 06' 49'' South Latitude and 1100^0 38' 54'' East Longitude- 1100^0 41' 05'' East Longitude. Administratively, the location of Semarang State University is bordered by Sukorejo Village in the north, Patemon Village In the south, Srondol Kulon Village in the east, and Kalisegoro Village in the west. The area of Semarang State University is 0.53 km^2 and consists of 8 faculties and 5 work units.

Student Behavior in Plastic Waste Management

Student behavior in plastic waste management will certainly greatly affect the credibility of the campus with a conservation perspective. Behavior performed by students certainly will be different. It is caused by several factors including their concern for the environment and the level of knowledge they have about plastic waste and conservation missions.

Information regarding student behavior in the management of plastic waste can be seen starting from the use of packaging for food and beverages that are still made of plastic, waste disposal, and the final management of plastic waste. The results obtained from several interviews and observations that have been carried out state that the level of student awareness is still the main problem that causes the use of plastic in their daily life, both in the campus environment and outside the campus environment. They also knew about the conservation mission owned by UNNES. This statement was expressed by one of the informants named Rara as a postgraduate student of UNNES semester 6, "yes, I know that mission, there are some that have been done through several design programs especially in the management of plastic waste, but sometimes I still produce the plastic waste, this is due to the unavailability of drinking water faucets or refilled drinking water, so if the drinking water I bring from home using the tumbler runs out, I have to buy plastic bottled drinking water (interview results, 25th April 2020)."

The results obtained from several interviews and other observations are the same. Most of them are from both undergraduate students and postgraduate students. Apart from internal factors such as the level of concern, there are also external factors that influence them, one of which is the availability of supporting facilities and infrastructure.

Student behavior in using plastics in meeting their daily needs continues to be a topic of discussion and will become a prolonged problem if not addressed immediately. The implantation of the pillars of values and character, art and culture, and the management of natural and environmental resources through conservation education courses have had a good enough impact to improve students' awareness of their environment.

According to one of the lecturers of conservation education courses, Prof. Dr. Dewi Liesnoor Setyowati, M.Si. she said, "the material provided can be used as a good foundation in the form of knowledge and experience in carrying out conservation will be able to become cadres who are ready to carry out the duty of preserving the environment, it is expected that when they have graduated from UNNES, the knowledge can be applied in social life (interview result, 30th April 2020)."

However, in fact, each knowledge owned and gained through conservation education courses is still very difficult to apply in daily life. We all know that almost all objects used to meet daily needs are still made of plastic. The use of plastics is still being the prima donna in its class because the shape is practical and easy to be found anywhere. This is the same as what was stated by Nadlifah, a UNNES undergraduate student, in her fourth semester, she said that, "why do I still use plastic, it is because there are still many other people using it so that there are still many and more used ones on the market, so we still use them want it or not and like it or not (interview results, 16th April 2020)."

This behavior is carried out because we are all already comfortable with it. Even though many students already know how the impact of plastic usage is. Small changes made little by little by some students have also been made even though they have not consistently carried out, but they have little by little changed their behavior, especially in the management of plastic waste. The Rector regulations issued by the campus also support the students to continue to carry out the behavior of good waste management as it should be.

One of the student behaviors, when they are outside the campus or in their boarding house, is to separate plastic waste from inorganic waste such as food and vegetable scraps. Even though, the transportation process and waste management are ultimately handed over to the cleaning officers assigned by local RW.

Overall, based on the results of interviews and observations that have been made, it shows that student behavior in the management of plastic waste still needs to be reviewed and continue to be monitored regularly. There must be synergy from the entire academic community to support and participate in implementing the conservation pillars of UNNES. The management of plastic

waste carried out by the campus continues to be carried out in stages even though in reality it is still not maximized.

Constraints internally and externally owned by students should have been solved by various policies or regulations issued by the campus. However, in reality, the implementation of these rules is not always accompanied by the availability of adequate facilities and infrastructure at all campus points. The existence of organic and inorganic trash cans is not yet available at all points of the campus, especially at the postgraduate campus. The evidence can be seen through the documentation in Figure 2 below.

(a) The existence of organic and inorganic trash bins located in UNNES Faculties at Sekaran Campus.

(b) The existence of trash bins at UNNES Postgraduate Campus

Figure 2. Differences in vailability of trash bins in Faculty Building and Postgraduate Building of UNNES.

The picture clearly shows that the availability of trash bins in each building is still not evenly distributed. The types of organic and inorganic trash bins have not been optimally provided. The availability of facilities and infrastructure becomes very important for students so that they can realize and apply waste collection methods as well as sorting waste correctly according to the type of waste produced when in the campus environment.

Criteria Analysis of Optimization Strategies of Student Knowledge and Behavior in Waste Management

The analysis in this study is carried out by using AHP analysis (Analytical Hierarchy Process) to determine strategic priorities for optimizing student knowledge and behavior in managing plastic waste in Semarang State University. The components of the AHP analysis used in this study consist of several criteria and alternatives obtained based on literature study, observation, and interviews with several key people who have expertise in line with this research, namely waste management.

The Analysis of Criteria for Facilities and Infrastructure

The provision of facilities and infrastructure provided by the University is very important in supporting waste management as well as being one of the strategies that become a medium in increasing knowledge and behavior as well as student behavior in waste management. In the criteria for facilities and infrastructure, there are 4 alternatives that will be analyzed using the Analytical Hierarchy Process (AHP). The results of the AHP calculation on the criteria for facilities and infrastructure are as follows:

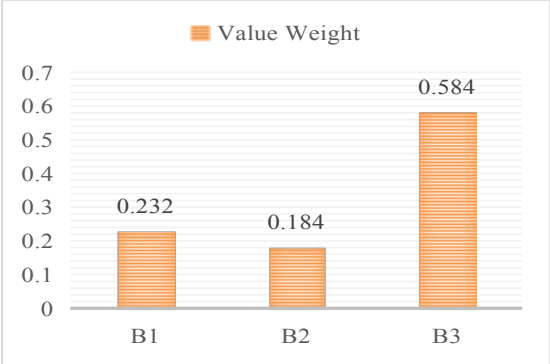

Figure 3. AHP Output of Criteria for Facilities and Infrastructure

Explanation:
Inconsistency Value: 0.05
B1: The provision of organic and inorganic trash bins
B2: The provision of information facilities through information boards
B3: The provision of drinking water faucets as an effort to reduce the use of plastic bottles

Figure 3 explains that based on the AHP analysis that has been carried out on the criteria for facilities and infrastructure, the value of inconsistency is below 0.1 (0.05 < 0.1), so it can be said that the answer from the key person is consistent. The most prioritized alternative is the provision of drinking water faucets to reduce the use of plastic bottles in the campus environment with a weight value of 0.584 or 58.4%. So far, the habit of students in meeting their drinking water needs while on campus still tends to depend on purchasing minerals that use plastic bottles so that they produce plastic waste. The culture of using plastic bottles is already inherent among students.

Based on the results of interviews with several students, it is found that the purchase of bottled drinking water is considered easy and simple so that it is more desirable than others. It makes the plastic waste that is produced pile up every day. Plus, the awareness of some students is still lacking so that they often throw away drinking water bottles carelessly.

The Analysis of Criteria for Human Resources (HR)

The calculation results from the Analytical Hierarchy Process (AHP) show that human resources are the second prioritized criteria in the strategy of student knowledge and behavior optimization in plastic waste management. Human resources are an important aspect involved in efforts to manage plastic waste. Human resources are stakeholders who take part support the success of waste management. These human resources consist of the academic community, such as lecturers, students, education staff, and other campus employees. In the criteria for human resources, there are 4 alternatives, which are analyzed using the Analytical Hierarchy Process (AHP). The results of the AHP analysis of the criteria for human resources are as follows:

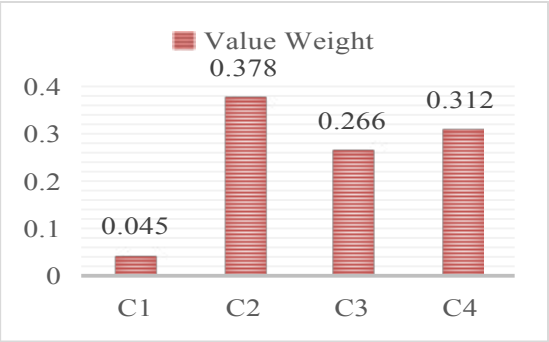

Figure 4. AHP Output of Human Resources Criteria

Explanation:
Inconsistency Value: 0.02.
C1: The formation of a community or organization caring campus environment
C2: The improvement of knowledge and behavior and student behavior through the provision of waste sorting workshop
C3: The improvement of knowledge and behavior and student behavior through FGD activities
C4: The guidance and monitoring of knowledge and behavior and student behavior.

Based on Figure 4, it can be seen that from the results of the AHP analysis in the criteria for human resources, the inconsistency value of 0.02 is obtained. Thus, it can be said that the answer from the key person has been consistent. The most prioritized alternative in the criteria of human resources is guidance and monitoring of knowledge and behavior and student behavior in waste management both in the campus environment and outside campus environment with a weight value of 0.424 or 42.4%. So far, efforts to foster and monitor students in plastic waste management have not been carried out optimally. It is caused by limited monitoring personnel who indeed have not been assigned especially. As a result of the lack of guidance and monitoring, the majority of students behave as if no one is watching so that they can throw garbage out of place. Guidance by the campus needs to be done either by providing appeals, training, or other activities to provide awareness for students about the importance of managing waste, especially plastic waste.

Policy Criteria Analysis

The calculation results from the Analytical Hierarchy Process (AHP) show that the policy is the last priority criterion in the optimization strategy of student knowledge and behavior in plastic waste management after facilities and infrastructures as well as human resources. In this case, the policy is aimed at various kinds of policies in the form of regulations by the Rector, which are derived from government regulations that support programs for reducing and managing plastic waste. The policies were established and trying to be implemented as a strategy in implementing the conservation mission of UNNES. The analysis results of AHP on the policy criteria are as follows:

Figure 5. AHP Output of Policy Criteria

Explanation:
Inconsistency Value: 0.05
A1: The Establishment of Conservation Development Agency (BANGVASI)
A2: Through BANGVASI waste management division, various programs were formulated
A3: The selection of the method of plastic waste management through Reduce, Reuse, Recycle (3R)
A4: Waste management analysis and management survey waste through the Waste Disposal (TPS)

The results obtained by Figure 5 can be seen that the results of the AHP analysis in the policy criteria have a value of inconsistency of 0.05 so that it can be said that the answers from the key persons have been consistent. The first alternative priority in the policy criteria is waste management analysis and waste management survey through Temporary Shelters (TPS) with a weight value of 0.424 or about 42.4%. The survey of plastic waste management through TPS can be carried out by assessing how far is the behavior of students in disposing of waste according to the place.

This study aims to find out student behavior in the management of waste to support UNNES in realizing the mission of conservation-minded and to analyze the optimization of strategies used so that students can improve the behavior.

Student Behavior in Plastic Waste Management

In general, student behavior in managing plastic waste to support the realization of the conservation mission owned by UNNES has not been able to run well. There are still many things that need to be improved so that this behavior can continue to run well following good waste management regulations.

Waste management according to Law No. 18 of 2008 stated that waste management is an activity that begins with sorting in the form of grouping and separating waste according to the type, amount, and nature of waste (Law Number 18 Year 2008). The behavior of plastic waste management which is carried out by students begins with the process of collecting waste through the trash provided by the campus and when in the boarding house. The collection process is the first step for students to be able to separate the types of organic waste and inorganic waste. Lack of awareness of the environment can cause the students to have bad behavior, especially in littering.

The results of this study state that bad behavior in managing plastic waste occurs because of the low awareness in managing plastic waste which is increasingly being used. In addition, trash bins for sorting plastic types are not available in every house because of the habit of people throwing plastic waste in the garden and burning plastic waste around the house. The availability of trash bin facilities is the first step for sorting plastic waste related to the practice of healthy living behavior (Setyowati & Mulasari, 2013).

The availability of trash bins is very important. The first obstacle after increasing the level of student awareness to care more about the environment is the availability of facilities and infrastructure, especially trash bins. The positive behavior that has been carried out by some students is one of the impacts of providing materials on conservation education courses. The results of this study state that a high level of education and knowledge will affect the improvement of community behavior in maintaining environmental sustainability (Azhar, 2015; Darmawan, 2016).

One of the efforts made by UNNES in providing knowledge on waste management is to provide conservation education courses. Hardati, et, al. (2016) mentioned that the provision of conservation education courses on the cognitive aspect is emphasizing the process of understanding in maintaining environmental balance.

Knowledge is gained through education but education does not always have a good impact on behavior change in waste management. However, high education does not guarantee good waste management behavior. It is assumed due to lack of awareness of waste management, laziness, and unwillingness to be bothered with waste problems (Sari & Mulasari, 2017).

Efforts that have been done by UNNES in realizing the vision and mission of its conservation must ultimately continue to be monitored periodically. The consistency of various programs

that have been carried out must continue to make improvements. Various regulations issued must be accompanied by the availability of adequate facilities and infrastructure at every point in all parts of the campus.

The provision of conversation education courses is also expected to be one way to increase student knowledge on the management of plastic waste. Because through the process of knowing, it will affect one's thoughts and feelings according to the information he gets (Kusumaningrum, 2020). It is in line with the research conducted by Zsoka et, al. (2013), which states that there is a strong correlation between the intensity of environmental education and student environmental knowledge.

The Criteria Analysis of Strategy Optimizing Student Knowledge and Behavior in Waste Management

Based on the calculation of the analytical hierarchy process on all criteria for optimization strategy of student knowledge and behavior in waste management with the help of expert choice 11 programs, the following results are obtained:

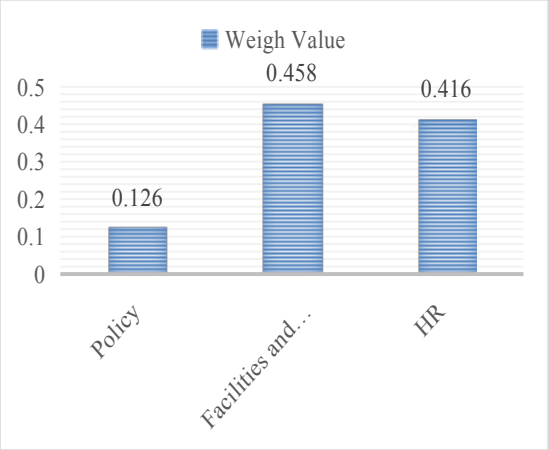

Figure 6. AHP Output of All Criteria for Optimization Strategy of Knowledge and Behavior in Plastic Waste Management

Inconsistency Value: 0.008

Based on Figure 6, it can be seen that the answer from the key person is consistent because the inconsistency value obtained is 0.008, which is still below 0.1. The criteria that have the highest weight value are facilities and infrastructure with a value of 0.458. It means that facilities and infrastructure are the most prioritized criteria in the strategy of optimizing student knowledge and behavior in plastic waste management by 45.8%. The second priority criterion is HR with a weight value of 0.416, and the last priority is the criterion policy with a value of 0.126 or 12.6%. Therefore, to optimize student knowledge and behavior in plastic waste management at Semarang State University, the stakeholders need to prioritize the facilities and infrastructure aspects because these aspects are the most prioritized compared to other aspects.

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