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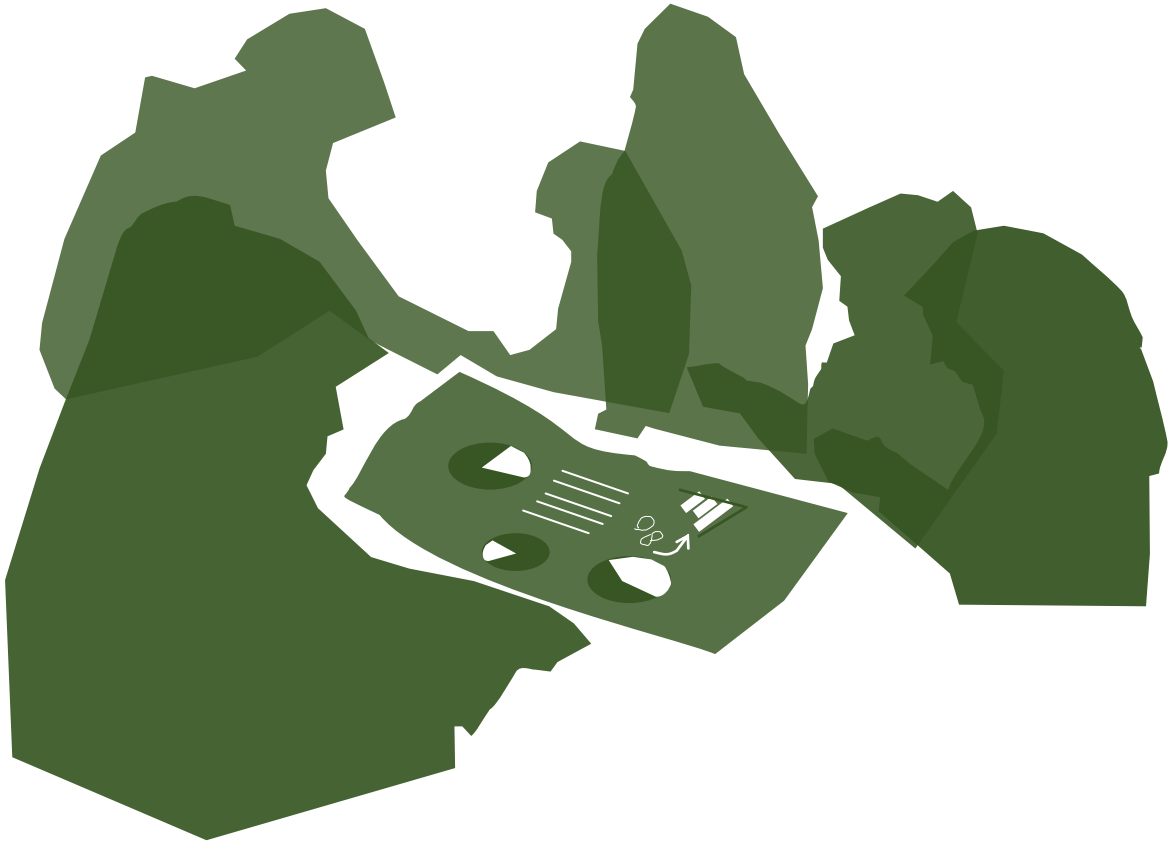

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COMMUNITY PARTICIPATION IN BAMBOO FOREST MANAGEMENT IN KITAKYUSHU CITY, JAPAN

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Abstract

The fast growing bamboo causes problems in Kitakyushu as it is able to invade other plant areas. Bamboo forests that are growing too fast are often left without being properly cared for by landowners. This worsens the condition of the balance of the ecosystem in this bamboo forest area. In this study, an investigation was carried out on efforts to manage bamboo forests in Kitakyushu City, especially those involving the community. Efforts to manage bamboo forests are carried out by the government and the community in Kitakyushu City. The volunteers come from students and the general public. Activities carried out include providing experience for community members to cut bamboo trees, make musical instruments from bamboo and perform performances using these musical instruments. This activity instills awareness in the participants to better maintain the balance of the existence of this bamboo forest. The potential for the use of bamboo is actually very wide open, both as a musical instrument, souvenirs, cooking ingredients, construction materials, activated carbon and others. However, efforts to increase the benefit value of these products still have to be made to compete with other raw materials.

Keywords: *bamboo forest, community involvement, fast growth, invasion, bamboo utilization*

Introduction

Bamboo is a plant that is easily found in tropical and sub-tropical regions (Mei et.al, 2015). There are more than 1000 species of this bamboo with its use since time immemorial. Bamboo is a plant that grows well in Japan, especially in the central and southern regions of the country. Kitakyushu is a city located on the island of Kyushu, in the southern part of Japan. Bamboo forest is very easy to grow in this area. Types of bamboo that grow in Japan include Phyllostachys pubescens and Phyllostachys edulis. Moso bamboo is a type of giant bamboo which is very famous in Japan. This type of bamboo is found in the tourist areas of the bamboo forest.

Due to its fertile growth, bamboo forests are easily expanded, meanwhile the use of bamboo as a building material has been increasingly abandoned. The nature of bamboo that dominates other plants is also a problem because it causes bamboo forests to invade other plantations (Kusaba et.al, 2008). Apart from being used as a building material, bamboo shoots can also be taken which are still very easy as a food ingredient. Bamboo shoots just emerging from the ground are an expensive menu. This resulted in reduced demand for Japanese bamboo shoots when cheaper imported bamboo shoots were made available from China (botaniboy.org, accessed March 19, 2021).

The condition of the expanding bamboo forest which can cause this problem needs to be

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handled properly. Several activities are carried out voluntarily by the community to manage this bamboo forest. This study aims to investigate the activities that have been carried out to anticipate the problem of this very rapid growth of bamboo. Activities that are focused on are those carried out by the community, especially groups of university students. In this study, it was also obtained the sustainability of the activities of the community that carried out the management of the bamboo forest. In addition, this study also aims to identify the potential uses of bamboo to offset the fast growing growth of bamboo in Japan.

Methodology

This study is formulated using several activities. In the first part, we identified the problems faced by the existence of bamboo forests in Kitakyushu City. Then, reporting on participation in voluntary activities for bamboo forest management. In the implementation of this activity, things that are done by the community are observed in relation to their routine events. In addition, observations were made regarding the duration of involvement of community members in participating in the management of this bamboo forest. The discussion in this study is also enriched with the identification of the potential uses of bamboo through a review of the literature, both from popular and scientific publications.

Result and Discussion

Bamboo Forest Problems

For more than 10 years, bamboo forests in Japan have become one of the ecological problems due to their rapid growth. The growth rate of bamboo can reach 30-100cm per day depending on the season (Francois et.al, 2019). This fast growth is not balanced by its utilization. As a building material, bamboo has been replaced by plastics and other materials. In terms of durability, bamboo is weaker than plastics and other materials. But actually bamboo really supports the use of environmentally friendly materials.

Another problem caused by the bamboo forest in Kitakyushu City is its ability to invade other plant groves. The dominance of bamboo growth resulted in reduced growth of other plants. Moso bamboo has a high allelopathic effect, resulting in other plants not being able to grow well in the vicinity (Teixeira da Silva et.al, 2015).

Community Activities

Bamboo forest management is promoted to the people of Kitakyushu City and is associated with programs to achieve the SDGs (Sustainable Development Goals). Communities are formed from voluntary communities with the aim of introducing more bamboo plants and participating in managing bamboo growth in Kitakyushu. Many of the general public think that bamboo forests are not a problem for nature, so one of the activities of this community is to provide an understanding of the issues faced due to the rapid invasion of this bamboo forest.

Some of the events carried out in the bamboo forest management community are the cutting down of bamboo trees that are expanding too fast (Fig. 1). In this event, volunteers can feel that fresh bamboo is quite difficult to cut down manually. Some of the land invaded by bamboo forests is owned by old people who are unable to maintain their land by cutting down these bamboo trees. Community members were also given experience in making musical instruments made from bamboo such as the violin, cello, ukulele, and percussion, assisted by a community organization called Chikurin Kyoshin. The use of bamboo as a material for making musical instruments has been done for a long time (Horner, 1998).

Figure 1. Bamboo cutting down experience.

Figure 2. Musical instrument made of bamboo.

Not only were they given experience in making musical instruments made from bamboo, volunteer members also performed live performances playing these instruments at the Kitakyushu Eco Live Stage. This event is the biggest SDGs event in Western Japan. Another event that was attended was the Satoyama Matsuri (Satoyama Festival) whose activities were aimed at bringing people closer to nature. At this event, bamboo is used for tableware.

The people involved in the volunteer activity for bamboo forest management come from various institutions. Kitakyushu University has an educational center called Lab421 which aims to involve student activities in solving problems in the local community together. Students joining this education center can choose the activity topics they want, for example peace, environment, etc. Each topic is carried out in collaboration with local organizations. Student involvement in Lab421 activities can be carried out since the first year and each year they can choose a different topic. Bamboo forest management is one of the topics that can be followed by Lab421 members. Apart from universities, volunteers for bamboo forest management also come from other parts of the community, both individually and in groups.

Figure 3. Bamboo as tableware.

Voluntary community involvement in the management of this bamboo forest is not limited to the duration of time. There are quite a lot of people who continuously carry out activities to promote the use of bamboo and maintain the balance of the bamboo forest in Kitakyushu. University students are usually intensively involved in bamboo forest management activities for 1 to 4 years. This duration is determined according to the topic taken

according to existing projects. The duration of student involvement is also determined by the length of the lecture. The volunteer activities of students who have graduated from university are usually continued by their juniors.

For people who are involved in the bamboo forest management community, awareness of the anticipated problems they are facing is increasing. Newly joined volunteers, including students from university, gained new knowledge and experience related to environmental issues due to the rapid growth of bamboo forests. In addition, additional information was obtained regarding the use of bamboo for several purposes. The motivation to choose bamboo as an environmentally friendly daily necessity is also increasing. The important result obtained is that efforts to contain the invasion of bamboo forests can be carried out properly.

Potential Utilization of Bamboo

The use of bamboo as a musical instrument is still carried out by certain communities, especially in areas that preserve the culture of their ancestors. However, the number of bamboo musical instruments is rarely used for professional musician activities, so the absorption of bamboo for the purpose of making musical instruments is not significant. However, it is hoped that each school can complement its music lesson activities by having this bamboo musical instrument as material to enrich students' knowledge.

As a building material, bamboo has also been popular since time immemorial. Although bamboo is relatively strong against earthquake shocks, its nature as an organic material that can be decomposed makes it more widely used for non-construction materials. Efforts are needed to increase the durability of bamboo in an environmentally friendly manner so that it can be used as a construction material for a long time (Kaur, 2018).

Bamboo shoots, the new growing part of young bamboo, are a food ingredient that is on the menu, especially in Asian countries. China exported bamboo shoots to Japan at low prices, so the use of bamboo shoots in Japan did not develop. However, bamboo shoot harvesting should continue for bamboo that has the potential to invade other crop areas. Thus, the price of bamboo shoots can compete with imported bamboo shoots. The benefits of consuming bamboo shoots include improving digestion, reducing excess body weight, treating cardiovascular disease and cancer (Chongtham et.al, 2011).

Bamboo charcoal has been proven in research to function as a water purifier as activated carbon works, especially when used in multilayers (Han et.al, 2017). The use of activated carbon has been carried out by the community to improve the quality of rivers in the upstream areas. Bamboo charcoal has good potential as a promising precursor in the production of activated carbon to offset existing activated carbon products on the market (Mahanim et.al, 2011).

There are several other uses of bamboo such as fiber raw materials for textile and paper products. However, the production process requires supporting materials and energy which are still questionable in relation to environmentally friendly processes. It is feared that these processes will actually damage the environment.

To support the potential for intensive use of bamboo, it is necessary to increase the benefits that consumers can get from using bamboo. In addition, increasing public awareness of the need to participate in solving the issue of bamboo forests must also be continuously pursued.

Conclusion

The existence of communities that carry out activities in bamboo forest management is very impactful, especially in terms of increasing public awareness of the importance of maintaining a balanced ecosystem in Kitakyushu. Events held in this community also increase the knowledge of its members about bamboo and its uses. This activity needs to be carried out continuously, balanced with technological improvements to the use of bamboo so that consumers can steadily replace the materials they usually use with bamboo-based products.

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BENTONITE APPLICATIONS IN SIMPLE PURIFICATION OF BULK COOKING OIL AS ALTERNATIVE SOLUTIONS FOR HOUSEHOLD COST EFFICIENCY

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Abstract

Utilization of Crude Palm Oil (Crude Palm Oil) in food cooking activities is a strong activity in Indonesian society, more than 80% of household activities use this type of oil to process food ingredients. The affordable price with a variety of packaging makes this type of cooking oil has many fans. A survey that has been conducted on residents of the Kalideres area with a total of 20 respondents stated that in addition to using new palm cooking oil in cooking activities, the majority of residents are also accustomed to using this oil used in cooking activities that require the deep-fried method. The quality of cooking oil is largely determined by the level of purity of the solution, the clearer the color of the solution, the better the quality, the darker the color of the solution indicates the presence of more impurities, the higher the saturated fatty acid emulsion, indicating poor cooking oil quality. This is what was raised in this community service (CS) activity, namely socializing alternatives to the use of purified bulk cooking oil. The purification material uses bentonite clay minerals which are heated and dissolved in a certain amount and duration of time which is able to maximize the adsorption power of impurities according to the natural structure of bentonite. CS activities carried out online include counseling and training activities for housewives in the economically densely populated Kalideres area. Through the socialization program for the purification of bulk cooking oil using bentonite clay minerals, it is hoped that residents will have an alternative to reduce the cost of processing food raw materials in a more effective and healthy way. This program is also expected to function as a medium to socialize the application of earth science in helping activities of daily living.

Keywords: *Bentonite, Bulk Oil Purification, Crude Palm Oil (CPO)*

Introduction

Kalideres Urban Village is administratively located in the city of West Jakarta, DKI Jakarta Province. With an area of 30.23 km^2, this sub-district is the largest area in West Jakarta, and the population is the second largest after Cengkareng sub-district (BPS-Statistics of West Jakarta, 2020). As a densely populated area with a high economic rate, the Kalideres area is full of population and environmental problems. Some of the environmental problems that are often present in this area are: waste problems, flooding, clean water crisis and environmental pollution, slum settlements, illegal street vendors, and land use management. High population

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density and unequal levels of the economy trigger socio-economic problems that reduce the quality of meeting the needs of daily life.

The use of Crude Palm Oil in cooking activities for food ingredients is an activity that is thick in Indonesian society. The results of a survey conducted by (Martianto, 2005) stated that the average use of cooking oil in Indonesia was 23 grams per day, with 77.5% of household activities using bulk cooking oil for frying food. The last survey conducted on 20 residents of Kalideres showed that as many as 22 people (65% of correspondents) used bulk cooking oil, or "jalantah", in their daily cooking activities. As used palm cooking oil that has been used many times, raw cooking oil shows poor oil quality, indicated by its dark color and foamy texture. The quality of cooking oil is largely determined by the level of purity of the solution, the clearer the color of the solution, the better the quality of the cooking oil. The darker the color of the cooking oil, indicating the presence of more impurities, the tendency for the emulsion to have higher levels of saturated fatty acids, which will certainly be harmful to health.

There are many ways that can be done to purify used palm cooking oil, including using rice, banana peels and even bleach to clear up the dark color of the solution. Some of these methods have been proven to be effective in clearing the dark color of cooking oil, but have not been proven to reduce the saturated acid content caused by repeated heating of used cooking oil (bulk oil). Currently in the market there is also bulk cooking oil that can be used directly for cooking activities, but because it has not been tested by BPOM, the quality and effect of using this oil on health is not known. This is what was raised in this community service (CS) activity, namely to socialize the role of Bentonite clay mineral as a purification material for bulk cooking oil, in accordance with the specifications of the speaker's expertise from the fields of geology and mining.

This CS aims to provide a solution for recycling used cooking oil in a simple way that does not endanger health. The results of CS can also be an alternative for residents to reduce the cost of processing food raw materials. Although there have been similar studies on the purification of used cooking oil using benthite material, this CS activity uses another approach in the form of simple oil processing that can be done in the kitchen of each resident's house. As an activity that socializes the role of natural materials to purify used cooking oil, this CS activity is an effective means of grounding the science of geology to be applied in daily life activities.

Research Methodology

CS activities are carried out for 1 day, namely on April 25, 2021 online starting at 09.00-11.00 via online zoom media. The participants consisted of residents of Kampung Rawa Lele, RT 004 / RW 007, Kalideres District, West Jakarta, DKI Jakarta Province. The target communities for this socialization are housewives (60%), traders (20%), students (10%), employees (5%), and community health center sanitarians (5%). From the income level, as many as 65% of participants have a fixed monthly income of less than Rp. 300.000/month, 35% of participants have a fixed monthly income above Rp. 300.000/month. The population density survey can be seen from the questionnaire on the number of family members who live in one house, 60% of the participants live in one house with more than 5 families, and 40% have less than 5 family members.

This CS activity is one of a series of socialization activities that raises the role of bentonite clay minerals to assist daily living activities. The two main topics raised in this CS activity are the role of bentonite as a purification

material for bulk cooking oil, and the application of bentonite in water filtration. Once the application of bentonite clay minerals, its affordable price is also a side that is highlighted in this socialization. The series of CS activities consisted of: delivering material on the topic "Mineral Bentonite as a solution to purify bulk cooking oil", interactive discussions between residents and a team of presenters, demonstration of bulk cooking oil purification through online video demos, questionnaire tests and polls, and door prizes given done at the end of the event.

Research Location

The location of the CS partner area is a densely populated residential area located in Kalideres District, West Jakarta, DKI Jakarta Province, with the location of the presenter being accessible as shown in Figure 1.

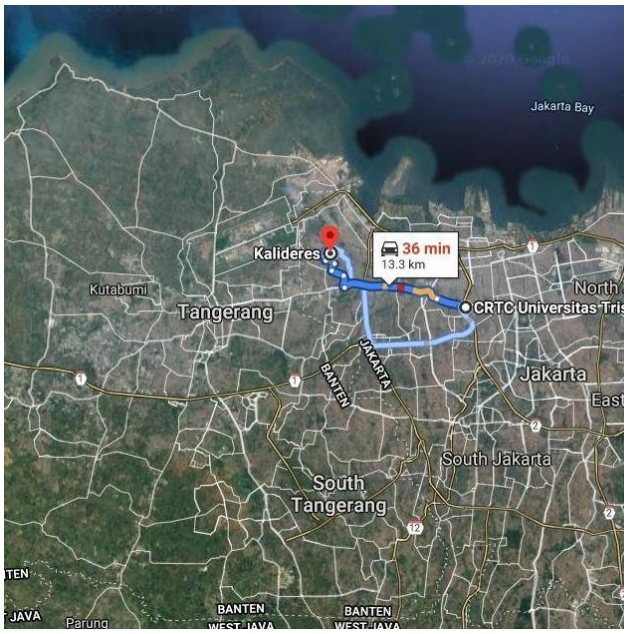

Figure 1. The availability of the CS location, namely Kalideres village from Universitas Trisakti (Utilization of Google Maps, 2021)

Methods, Tools and Materials

Related to the objectives to be achieved, this CS activity is carried out in several stages, namely:

Preparation of activities, including:

1. Permission procedure to the head of RT/RW (neighbourhood head/ head of hamlets)
2. Bulk cooking oil purification experiments, including:
   - Preparation of bulk cooking oil and active benthonite adsorbent (bentonite $+H_2SO_4$)
   - Cooking oil + active bentonite is stirred and heated using a stirrer in the laboratory
   - Cooking oil+active bentonite is stirred manually and heated manually on a gas stove
   - Cooling and separation of cooking oil solution from bentonite clay and filtering on oil paper
   - Test the quality of used cooking oil that has been clarified using physical parameters such as: color, level of turbidity, odor/taste
3. Implementation of activities, including:
   - Polling filling (before CS event)
   - Counseling on healthy and suitable cooking oil
   - Description of the characteristics of the mineral bentonite and its various applications in life
   - Demonstration and demonstration of bulk cooking oil purification through video demo
   - Interactive discussion and Q&A
   - Filling out the questionnaire (after the CS event)
   - door prize

The process of purification of road oil was carried out using 2 methods, laboratory experimental methods and manual experiments

using simple kitchen utensils. Figure 1 shows the equipment used during the purification of crude oil in the Chemistry laboratory, namely equipment in the form of weighing equipment, measuring cups, and magnetic stirrer.

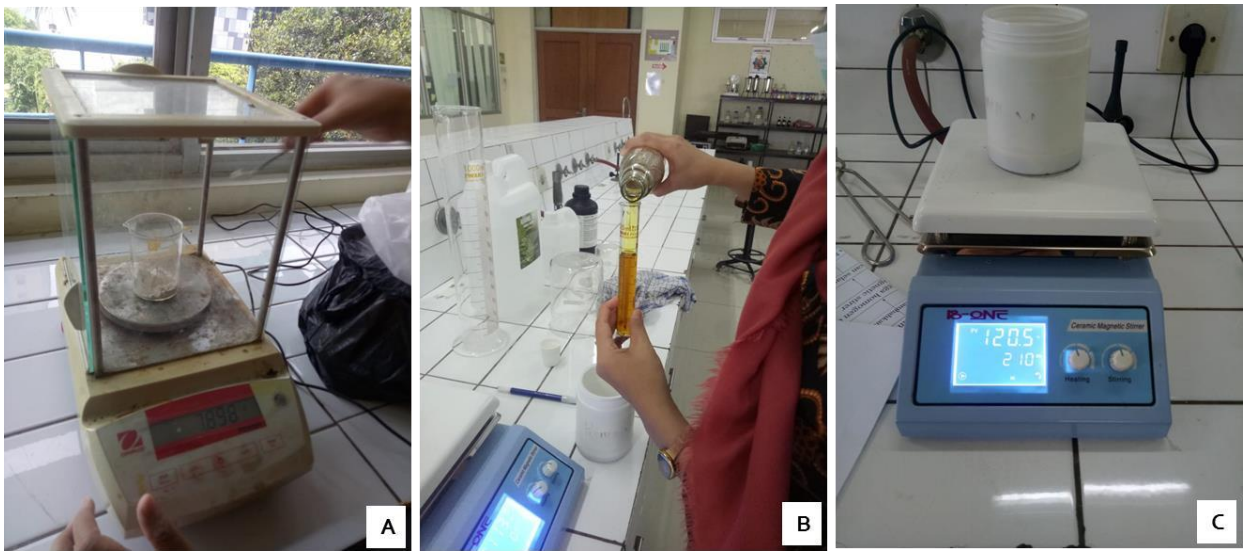

Figure 2. Laboratory equipment used during the oil clarification experiment, including weighing equipment (A), measuring cup (B), and magnetic stirrer (C)

Result and Discussion

The CS activity has been carried out online using a zoom platform that is connected to the poll application and online questionnaire. This CS activity is a multidisciplinary outreach activity that raises the natural character of bentonite clay whose crystal structure is layered, so it is very effective as an adsorbent material for impurities from solution. The event ran smoothly and interactively with online presentations interspersed with polling sessions and filling out questionnaires through the quiziz online application. At the end of the event, an electronic pulse voucher was given to 3 selected participants who were taken from the participants who asked questions. During the event, the participants looked enthusiastic as seen from the questions that came in during the discussion session and the results of the contents of the questionnaire which showed that the counseling materials had been well absorbed by the participants. Figure 3 shows the documentation of CS activities carried out online.

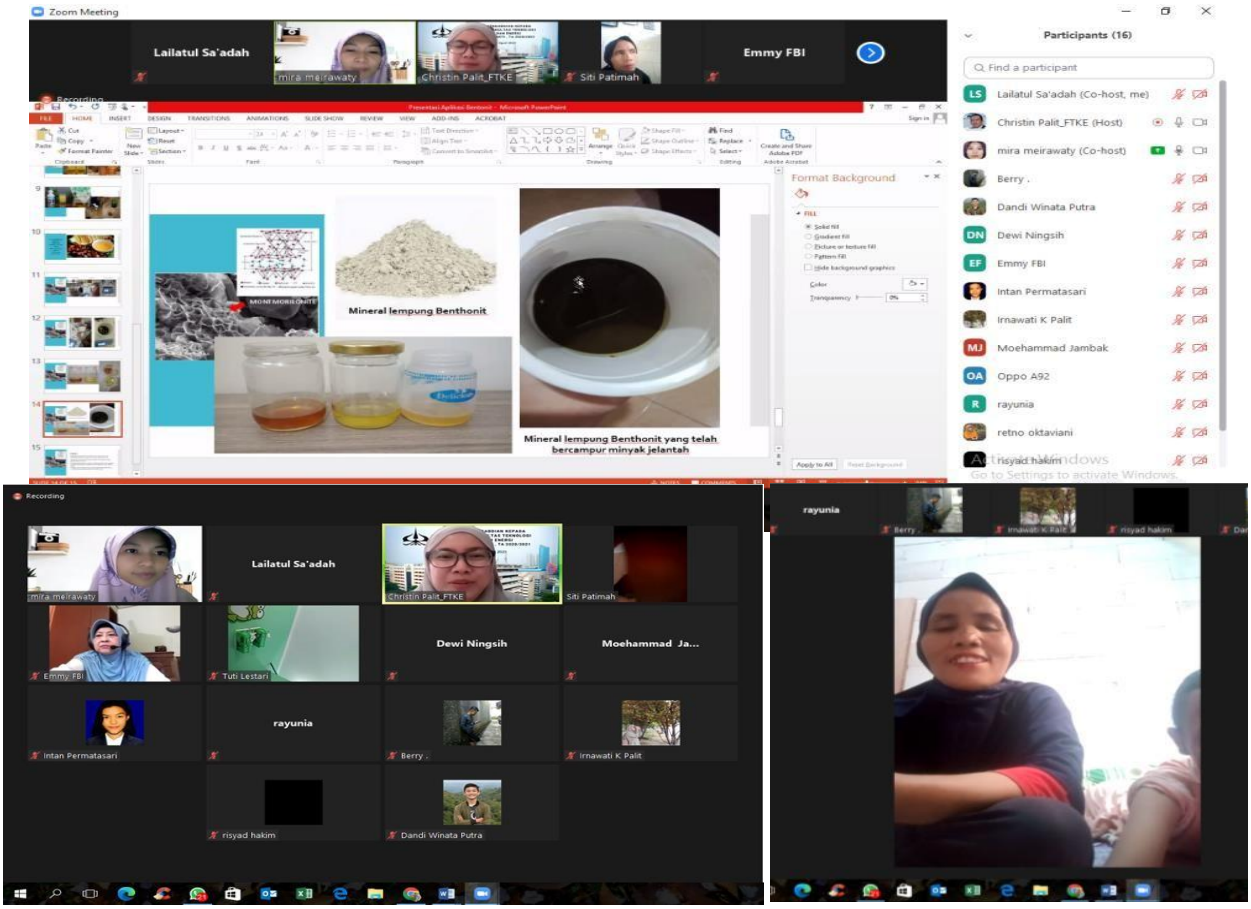

Figure 3. Documentation of CS activities during the material presentation and question and answer

Bentonite clay minerals are part of the smectite group which has a layered structure, will expand when dispersed into water, so it is very well used as an adsorbent material (Mukherjee, 2011). The results of research conducted by Darmadinata, M., et al (2019) showed that activated bentonite using 1.5 M H_2SO_4, the crystal surface area would increase so that the adsorption ability of the adsorbent was more optimal. The bentonite material used in this purification activity is bentonite clay that is not activated. But even so, engineering activities that only utilize the natural properties of bentonite as an adsorbent have shown significant results in changing the color of bulk oil from dark brown to clearer. The purification is done by mixing bentonite material with crude oil in a ratio of 1:5. After being mixed, the bentonite + crude oil solution was then stirred using a magnetic stirrer while heated for 60 minutes. The cooled solution is then left for 24 hours so that the coarse particles settle to the bottom of the solution. After the phase separation occurs between the liquid oil and the bentonite solids that tend to collect at the bottom of the solution, filtering is carried out using oil paper to separate the bentonite material that is still dissolved in the purified oil.

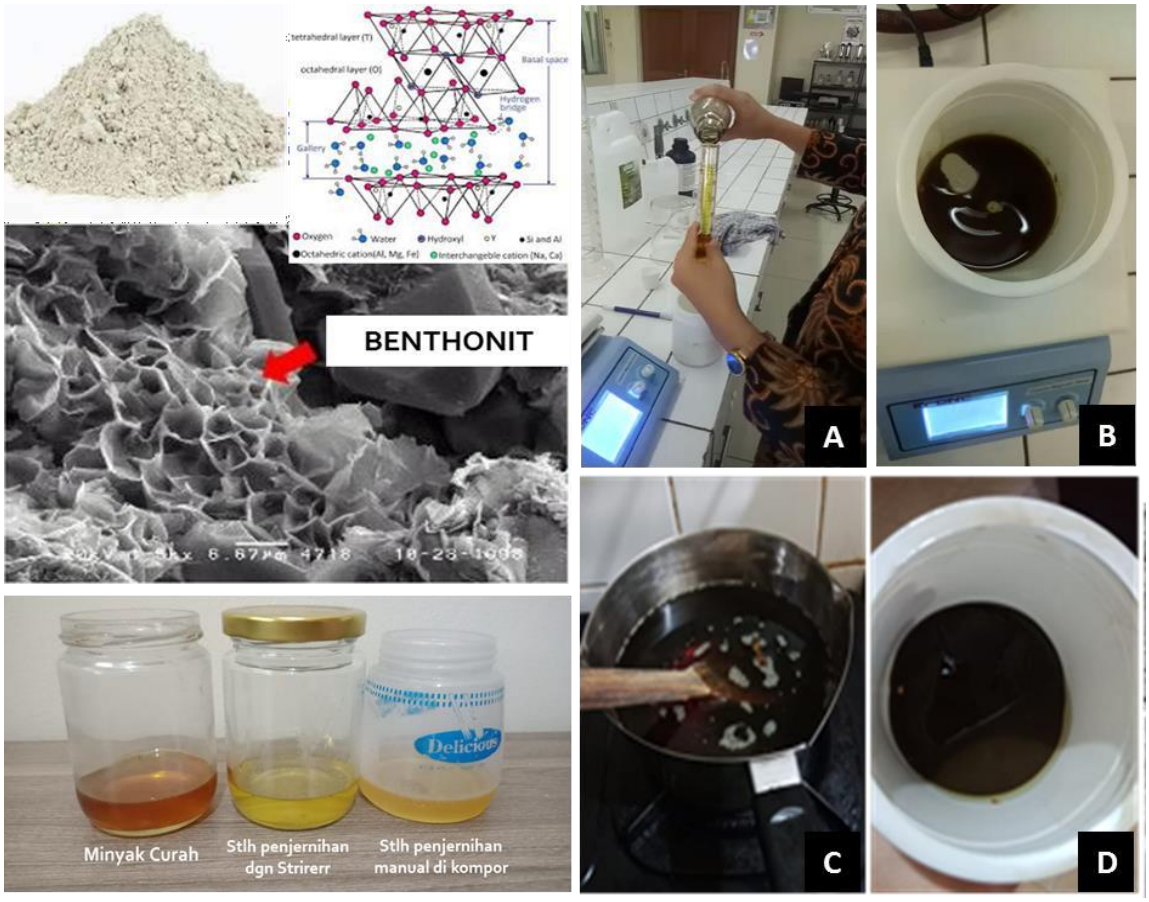

Figure 4. Cleansing activities of used cooking oil in the chemical laboratory (A, B), cleaning activities with manual stirring on the stove (C, D), and comparison of the results

In addition to being carried out in the laboratory, a simpler manual purification activity is also carried out to see the effectiveness of the purification of the two different methods. This purification practice is simpler, namely mixing bentonite material and crude oil in a ratio of 1:10. Then the solution is heated on the stove while stirring for about 10 minutes. After the solution cools, it is then left for 24 hours to allow the separation of fractions between solids and liquids. Filtering using parchment paper was then carried out to clean the bentonite which was still soluble in the purified crude oil. Figure 4 shows the process of purification of raw cooking oil carried out in the laboratory, the purification of used cooking oil which is carried out manually on the stove, and a comparison of the results.

Evaluation

The success of this Community Service (CS) activity can be seen from the following two benchmarks:

1. Positive response from counseling and training participants; Participants' responses will be observed during the socialization activities. The questions that came in during the discussion session and the high enthusiasm during the event showed that the participants had given a positive response to the implementation of CS activities
2. Increased knowledge of participants after receiving counseling and training. The benchmark for increasing participants' knowledge and skills after socialization can be seen from the results of online questionnaires for CS participants.

Correspondents consisting of housewives (60%), traders (20%), students (10%), employees (5%), and puskesmas sanitarians (5%), were able to answer questionnaire questions related to the material correctly. . Participants also participated in the event and discussion enthusiastically, indicating that the purpose of the extension in the form of socializing the bulk cooking oil purification program had been achieved.

Another benchmark used during the CS implementtation is the online poll media. The results of the poll for the CS Program for Cooking Oil Purification with Bentonite CS participants (respondents) who participated in the poll were 20 people, with varying levels of education ranging from junior high school to undergraduate. The poll includes 2 (two) questions:

1. What cooking oil do you usually use for daily cooking?
   a. Palm cooking oil : 100%
   b. Apart from palm cooking oil : 0%
2. How often do you use bulk/used palm oil?
   a. Often 65%
   b. Never 35%

Table 1. Distribution of examples of the use of palm cooking oil

Question	Response (%)		Total
	a	b	
1	100%	0%	100%
2	65%	35%	100%

Based on the poll results, a total of 100% of correspondents use palm cooking oil in their cooking activities, this is possible because the price is cheaper and easily available in the market. In addition to the results of a poll about the repeated use of palm oil for cooking, 65% of the respondents stated that they often used it and 35% of them never or only used it once. This is possible because of the high economic level or already aware of the dangers of using cooking oil repeatedly.

Then for questions:

"Have you ever heard of the process of purifying bulk palm cooking oil?"

This question was conducted 2 times, before and after CS socialization, the results showed different results:

Based on the results of the poll, it showed that after socialization on the purification of palm cooking oil with bentonite showed 100% understanding and knowledge knowing that bentonite, which is a type of clay mineral, can be used to purify used cooking oil. In the poll after the socialization event, the level of interest in applying this method after the event was also asked, only 10 people (50%) stated that they would try this method. It is assumed that the method is still not practical and the materials used are not common materials so that it makes participants think twice about trying it.

Activities Supporting and Inhibiting Factors

The supporting factor for the implementation of this CS activity is the cooperation of the CS activity partners, which in this case is Mrs. RT and the residents of Rawa Lele Village, Kalideres, West Jakarta. The enthusiasm of the participants was also very visible during the activity, reflected in the active participation of the participants in answering the quiz questions as well as the various questions about the cooking oil purification method that were asked. Some housewives also criticize whether this clay mineral is an effective method to reduce saturated fat content in bulk cooking oil or not, and how to obtain it because this type of material is not available in general stores.

The inhibiting factor is the lack of socialization of activities so that it has an impact on the number of participants who attend. The form of online/online activities is also constrained because not all residents are familiar with the "zoom" online platform, especially for the lower middle class people who are not too in touch with online electronic media. The professional background of the participants, consisting of housewives, employees, traders, sanitarians at the puskesmas and students, did not become an obstacle, instead the diversity of professions warmed the atmosphere during the discussion based on the varied topics of questions that came in.

Based on the results of the poll, it showed that after socialization on the purification of palm cooking oil with bentonite showed 100% understanding and knowledge knowing that bentonite, which is a type of clay mineral, can be used to purify used cooking oil.

Conclusion

From the implementation of this CS activity, it can be concluded that:

1. The CS activity "Socialization of Bentonite Applications in Purification of Bulk Cooking Oil" has been useful in adding insight and educating CS participants about the use of proper cooking oil. It can be concluded from the results of the questionnaire that showed changes in the knowledge of the training participants, from initially only 35% of participants knew about information on purification of bulk cooking oil until it increased to 100% of participants who understood the criteria for proper cooking oil and alternative purification using bentonite, after the CS activity was carried out. Of the 100% who are aware of the importance of using cooking oil according to health standards, only 50% are interested in trying alternative techniques using bentonite, this shows that the purification method is still not practical to implement, it is necessary to explore the application of appropriate technology that makes it easier for residents to access and use it. in daily routine.
2. The results of the questionnaire given to 20 respondents from Kalideres represent a description of the behavior of the Indonesian population, some of whom are accustomed to using used cooking oil for cooking

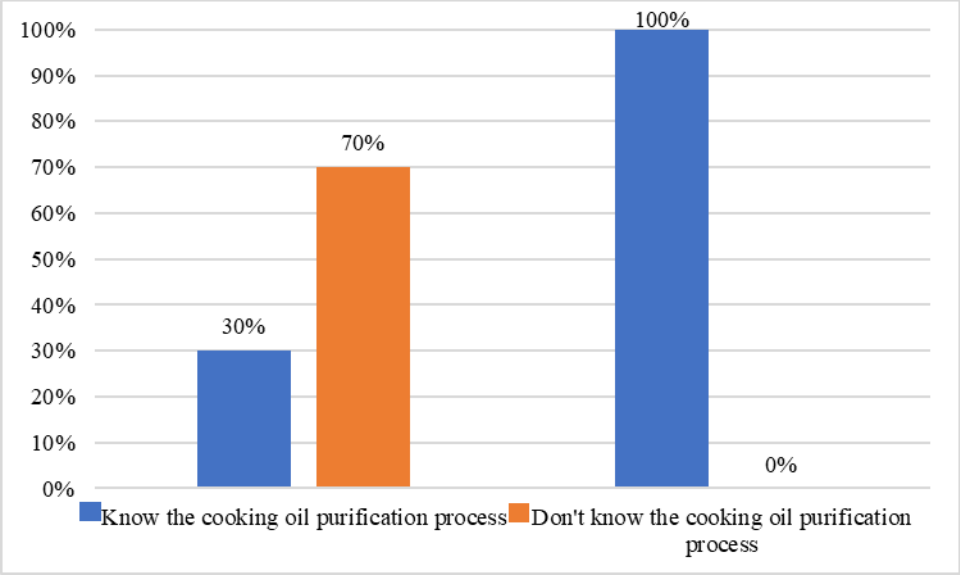

Figure 5. The results of the poll before and after the socialization event

activities. Of the 20 respondents, 60% of them still use used cooking oil in the processing of foodstuffs that require the deep-fried method. This socialization and training activity is important to also be carried out in other places, as an extension of a healthy lifestyle for the community in general

3. The 3R (Reduce-Recycle-Reuse) pattern of waste road oil needs to be considered as an integrated activity that is integrated with each other. The cleaning activities of used cooking oil using bentonite are in the realm of recycling which in the end will still produce waste cooking oil which is not good for the environment.
4. The method of purifying used cooking oil using bentonite can be useful as an alternative to reduce the cost of daily living expenses, considering the price of palm cooking oil that fluctuates in the market, and bentonite material which is relatively affordable. The scientific background of the speaker who comes from geology and mining science makes the speaker familiar with the characteristics of the bentonite used, as a solution for reusing raw oil, in a safe way that does not endanger health.
5. The model of an integrated approach to processing used cooking oil using bentonite minerals can be replicated to other locations.

The suggestions for CS activities:

1. The purification process using bentonite material has proven to be able to change the color of the crude oil from the original dark brown to a clearer one. The level of clarity is one of the parameters of good cooking oil quality, but this needs to be validated through laboratory tests to measure saturated fatty acid levels, impurity cation levels, and water content, in order to obtain recycled clear oil that complies with health quality standards. In the future, it can be considered to add other materials such as charcoal in the purification material, to optimize the role of the adsorbent for purifying used cooking oil.
2. Practical and economical method solutions are important points needed by the community in knowledge transfer activities between academics and non-productive partners. It is necessary to think about the application of appropriate practical technology in designing purification using benthonite, so that this method is applicable and can be practiced directly using simple household appliances. In the future, the bentonite material used will be activated first as a cost efficiency strategy and optimizing the adsorption power of bentonite minerals.
3. The topic of CS should be continued with an integrated approach, the use of bentonite material in the bentonite potential area to be applied directly in the purification of bulk cooking oil in the area.
4. CS activities will be good if they are carried out in labor-intensive areas such as MSME centers or densely populated residential areas for home-scale entrepreneurs

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PLANNING OF DOMESTIC WASTEWATER FACILITIES (CASE STUDY: BABAKAN VILLAGE, CIPARAY DISTRICT, BANDUNG REGENCY)

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Abstract

Babakan Village has a problem that there is still a lack of facilities for wastewater. This condition can be seen from the access to the toilets of 2436 households; only around 1506 families have access to family/ shared latrines and 625 households that meet technical requirements. For this reason, this plan is useful for increasing access and meeting community needs for domestic wastewater treatment facilities in the study area. This planning stage begins with a survey and sanitation inspection to determine 3 priority areas for handling. Determinants of this priority area use the method of scoring and weighting the risk. The weighting results put sub village 02 with a score of 2.3, sub village 05 with a score of 2.25, and RW 10 with a risk value of 2 as the priority area for planning handlers. Primary data collected will be used as a consideration for determining the technology to be applied. The technology chosen for processing is the communal septic tank for people who do not have treatment. In contrast, for the washing bath, toilet with a biofilter unit for people who do not have wastewater infrastructure.

Keywords: *Wastewater Access, Communal WWTP, Weighted Risk, Scoring, Priority Areas*

Introduction

Babakan Village, located at Bandung Regency, Indonesia, facing several problems concerning environmental issues (Yustiani et al., 2019). One of the problems in Babakan Village is that there are still many people who do not have a septic tank or proper disposal of household waste (Buku Putih Sanitasi, 2016). The household waste is discharged into the river or the simple septic tank, which does not follow technical requirements. The management of domestic wastewater in Babakan Village is currently not a concern of the community or government.

Domestic wastewater treatment is one of the housing health requirements in the Minister of Health Decree No. 892 of 1999. One of the aspects is that wastewater originating from the house is not allowed to pollute water sources, does not cause odor, and does not pollute the soil surface. Therefore, we need a way to treat wastewater so that it does not negatively impact the environment and health (Mulyatna et al., 2021)

Based on these sanitation problems, it is necessary to have a domestic wastewater management system. In this study, a community-based sanitation facility and infrastructure development for the people of Babakan Village, Ciparay District, Bandung Regency will be planned.

This study aims to plan a management system for wastewater facilities and infrastructure in the Babakan Village area.

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Research Methodology

Overview of the Study Area

Babakan Village is divided into 5 Hamlets, 18 RW (sub village) and 51 RT (Sub-sub village/ SVV). The number of residents living is 8311 people, 2401 families with 4292 male and 4019 female (Anonymous, 2018).

The location of the map of the Babakan village area can be seen in the image below:

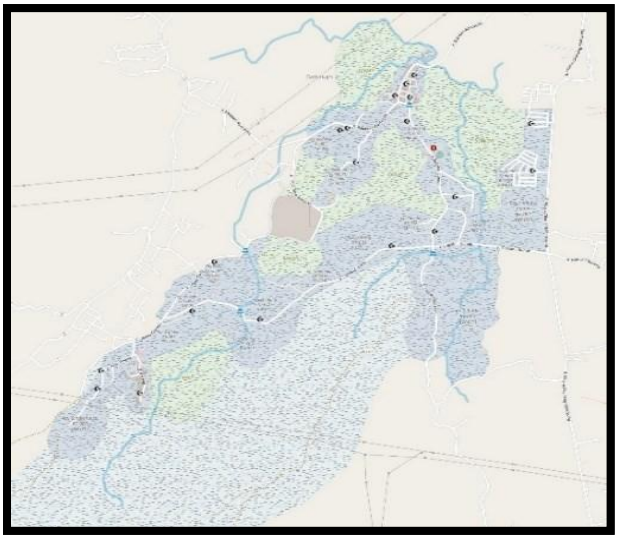

Figure 1. Map of the Planning Area

Babakan Village is located at 750 meters above sea level with a rainfall of 70 mm/year. The land (topography) of the plateau is 70, the slope is 45%, with an average air temperature of 28oC to 32oC. The area of Babakan Village is 4883.2 Ha, consisting of 4702.2 Ha of residential space and 181 Ha of Paddy fields.

Based on data from the Babakan Village office in 2019, the existing conditions of the wastewater facilities are as follows:

- The number of people having access to family toilets or shared latrines (5 families/latrines) (household units) is as many as 1506 households.
- According to technical requirements, the number of family toilets / shared latrines (having a gooseneck toilet connected to a septic tank) / (household unit) is 620 households.
- Separate household sewerage with 1% environmental drainage channel

Data collection

The data required is divided into two, namely primary data and secondary data.

a. Primary data :

The location survey is needed to directly see the conditions in the field in the form of plans for wastewater treatment facility placement and land availability.

The survey method used is an inspection to analyze the risk of wastewater facilities and infrastructure in the study area and to determine the level of community demand for clean water, wastewater, and waste facilities and infrastructure in determining priorities in providing and building sanitation facilities and infrastructure. Those are fundamental to improving standards of living for people (Bartram & Cairncross, 2010).

b. Secondary Data:

- Village Profile Data
- Population Data
- Sanitation facility data

Determination of Number of Respondents

Determination of the number of respondents is using the Slovin formula. This is based on the known population size (Ariola, 2006).

The house equation used is:

$$n = \frac{N}{1+Ne^2} \quad (1)$$

Therefore:

$$n = \frac{2404}{1 + 2404 \times (0.1)^2}$$

So, the number of respondents was spread to as many as 96 families. The selection of respondents was carried out by non-random

proportional sampling based on the number of samples of households in each RW.

The following formula is used in sampling as follows:

$$fi = \frac{Ni}{N} \quad (2)$$

$$ni = fi \times n \quad (3)$$

The following is a table of the number of samples for each sub-village (RW).

Table 1. Number of samples

No	Number of RW	Number of Population	Number of samples
1	RW 01	169	7
2	RW 02	214	7
3	RW 03	174	7
4	RW 04	157	6
5	RW 05	150	7
6	RW 06	90	4
7	RW 07	152	6
8	RW 08	95	4
9	RW 09	109	4
10	RW 10	89	4
11	RW 11	120	5
12	RW 12	178	7
13	RW 13	154	6
14	RW 14	175	7
15	RW 15	140	6
16	RW 16	46	2
17	RW 17	105	4
18	RW 18	79	3
Total		**2404**	**96**

Distributing Questionnaires

The first phase of the questionnaire was distributed in all areas of the Babenna Village in 18 RWs. Filling out the questionnaire was carried out by direct interview and inspection of wastewater facilities and infrastructure by observing the respondents' facilities and infrastructure conditions.

Sanitation inspection examines the condition of facilities and infrastructure to obtain information on potential risks of wastewater facilities.

Determination of Risk Value

The determination of the sanitation risk value in the study area used scoring and weighting methods.

a) Scoring method: a score for each question sheet to assess the condition of the wastewater facilities (sanitation inspection).

The formula used:

$$score = \frac{YES\ answers}{Total\ of\ questions} \times 100\% \quad (4)$$

Risk Category

<33%: Low (R)
34% - 66%: Moderate (M)
> 67%: High (T)

b) Weighting risk

Risk weighting is a decision-making technique that gives weight to these risk factors (Muhammad 2014). Weighting the risk helps determine areas that have high, medium, and low sanitation risks.

The formula used is:

Value Risk = score × weight value (5)

Weight value category (%) (Asusmsi)
50%: High (T)
35%: Moderate (M)
15%: Low (R)*Nilai asumsi yang digunkan berdasarkan analisa resiko skoring.

c) Range Value Determination

The method was used to define ranges with a distribution rule (Strurgess Rule).

d) Mapping of Sanitation risk

This mapping aims to map the risk area based on the level of risk value for wastewater sanitation. The results of the risk mapping will then be selected 3 RWs that have the highest risk value which will be designated as the study area.

Result and Discussion

Data Analysis (Phase I)

Based on the results of questionnaires that have been distributed, it can be seen that the respondents' age group, level of education, occupation, and income.

In the age group most of the respondents were dominated by the age group <48-56 as much as 26% and the age <39-45 as much as 25%, in the education level group most of the respondents were graduated from elementary school, namely 73%, in the type of work most of the respondents were laborers / coolies, namely 52%, for the majority of income is still below 1 million, which is 46% and for the number of children per family is less than 5 people by 39%. The percentage can clearly be seen in Figure 3.

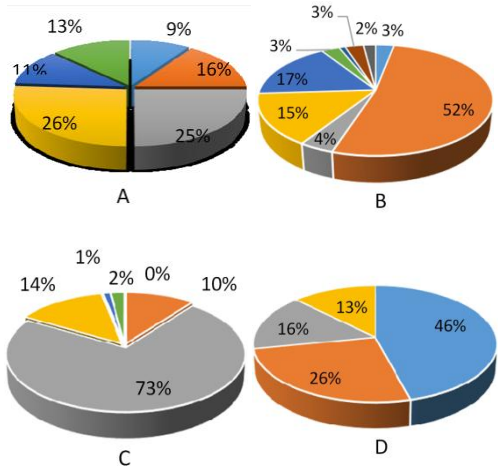

Figure 3. A. Age, B. Employment, C. Education, D. Income

Wastewater Access

Access to wastewater facilities in the study area consists of several components in the questionnaire. Some of the aspects that are of concern in the questionnaire include: The place where family members defecate (ODF), the place where waste water is channeled, and the impact of direct disposal of waste into the environment (Hardjosuprapto, 2000), (PerMen PUPR, 2017).

The percentage can clearly be seen in Figure 4. From 100% of respondents who have private latrines, 61% of respondents. For the sanitation facilities above, it shows that 5% of respondents use shared latrines and 9% of respondents use washing baths without defecating and meanwhile 25% of respondents practice defecating in pools and empty land because they do not have private latrines at home. respondents who do not have private latrines use the shared latrine facility or share a ride with relatives.

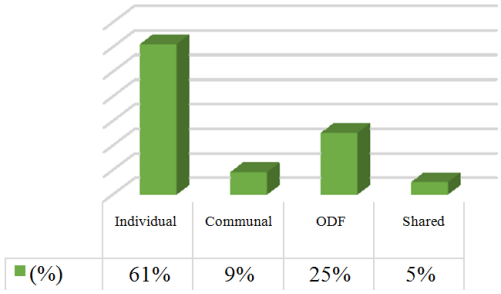

Figure 4. Wastewater Access

Note**:**

Public MCK: Only used for bathing and washing without defecating because there is no water closed facility (WC). ODF: Head of family / community whose access to the toilet is still defecating in ponds / ponds and rivers.

For those who have private latrines as many as 61% of respondents and 30% of respondents have private septic tanks, however, respondents who claim to have a septic tank stated that they have never drained them. From this answer, it can be ascertained that the septic tank may not be in accordance with the correct construction requirements. This was confirmed by the statement of one of the residents from Babakan village who stated that the septic tank in the area was deliberately not made tight. Meanwhile, 31% of other respondents use cubluk to distribute non-impermeable domestic

wastewater, polluting the environment. Cubluk will be permanently closed with soil when it is full and will replace it by digging new cubluk holes as new waste water reservoirs, replacing cubluk is usually every 15 years.

From the results obtained, it can be concluded that domestic waste in the area has not been properly treated, either gray water or black water.

Need for Wastewater Facilities

The need for sanitation facilities and infrastructure is needed to determine the community's response to the required sanitation facilities and infrastructure (Prameswari & Purnomo, 2014). The questionnaire results from 100% of respondents in the study area showed that 50% of respondents needed wastewater facilities and infrastructure.

Wastewater Risk Value Determination

The following are the results of the sanitation inspection scoring which can be seen in Table 2 below:

Table 2. Potential risk scoring

RW	Latrine ownership	Potential risks		
		High (6-7)	Moderate (3-5)	Low (0-2)
01	4	0	4	0
02	5	4	1	0
03	5	0	2	3
04	6	0	2	4
05	2	4	1	0
06	4	0	1	3
07	4	0	4	0
08	2	0	2	2
09	2	0	2	2
10	1	4	0	0
11	2	0	2	0
12	3	1	3	0
13	3	0	4	0
14	7	0	2	5
15	6	0	0	6
16	2	0	0	2
17	1	1	0	0
18	1	1	0	0
Total	72	12	32	27
Percentage %	100%	17%	46%	36%

The result of the wastewater risk assessment shows that 100% of the respondents have their own latrine. Seventeen percent (17%) of respondents have high potential risk, 46% middle risk, and 36%. In this condition, the risk value is high because the sewerage is discharged directly into the river and the latrine does not have a wall to cover the user and the latrine is not built according to the technique. Moderate condition because the toilets have less than 7m of pollutant sources and the latrines are not made according to a technicality. In low state, the latrine is protected by a wall.

Weighting risk

The following are the stages of risk weighting.

Table 3. Range of Risks

Risk	Score
Low	<1.1
Moderate	1.1 – 1.7
High	>1.7

The following are the results of the risk assessment of wastewater facilities.

Table 4. Wastewater Risk Assessment

RW	Risk			Risk Value	Risk Level
	H (50%)	M (35%)	L (25%)		
01	0	1.75	0.5	1.7	M
02	2	0.35	0	2.3	H
03	0	0.7	0.75	1.45	M
04	0	0.7	1	1.7	M
05	0.5	1.75	0	2.25	H
06	0	0.35	0.75	1.1	M
07	0	1.4	0	1.4	M
08	0	0.7	0.5	1.2	M
09	0	0.7	0.5	1.2	M
10	2	0	0	2	H
11	0	0.7	0	0.7	L

RW	Risk H (50%)	Risk M (35%)	Risk L (25%)	Risk Value	Risk Level
12	0.5	1.05	0	1.55	M
13	0	1.4	0	1.4	M
14	0	0.7	1.25	1.95	M
15	0	0	1.5	1.5	M
16	0	0	0.5	0.5	L
17	0.5	0	0	0.5	L
18	0.5	0	0	0.5	L

Priority Location Selection

The location of the sanitation plan with the highest risk was in the RW 02 area with a score of 10.15, RW 05 with a score of 9.85 and RW 10 with a score of 8.

Data Analysis (Phase II)

Determination of the number of respondents still using the Slovin formula with the number of questionnaires distributed as many as 82 samples of families with the tolerance limit used is 10%, with the following details:

Table 5. Number of Respondents

RW	RT	Number of households	Number of samples
	1		13
2	2	214	13
	3		13
	1		10
5	2	150	9
	3		9
	1		5
10	2	89	5
	3		5
Total		453	82

Characteristics of Respondents

Based on the questionnaire results, 59% of the respondents were male, and 41% were female.

In the age group, most of the respondents were <46-54, which was 27%, in the education level group, most of the respondents were primary school graduates, namely 68%, in the type of work most of the respondents were laborers / coolies, namely 52%, for part income amount is still below 1 million, namely 50% and for the most significant number of children per family is less than five people by 49%. The percentage can be seen in Figure 5.

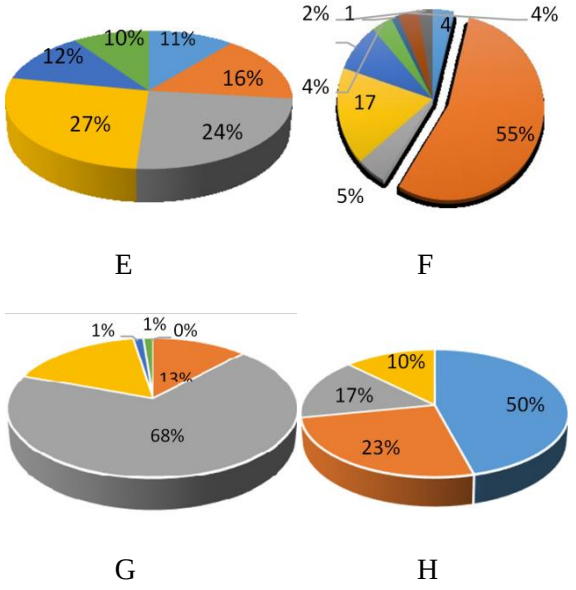

Figure 5. E. Age, F. Employment, G. Education, H. Income

Wastewater Access in Priority Areas

The questionnaire results related to sanitation conditions found that 51% of respondents said they knew sanitation.

However, it is estimated that community sanitation knowledge is still limited to environmental hygiene, while other aspects of sanitation, namely domestic waste management, are still foreign to the community. From the questionnaire, it was found that 60% of respondents stated that they knew the impact of direct disposal of domestic waste to the environment. The percentage can be seen in Figure 6.

Access to sanitation facilities shows that 60% have private latrines, 35% do not have private latrines, 4% public toilets, and 1% public toilets. The areas that do not have access to private latrines are RW 02 RT 03 and RW 10. The main reason for the difficulty of providing wastewater facilities is this economic factor as evidenced by the low income of the household head.

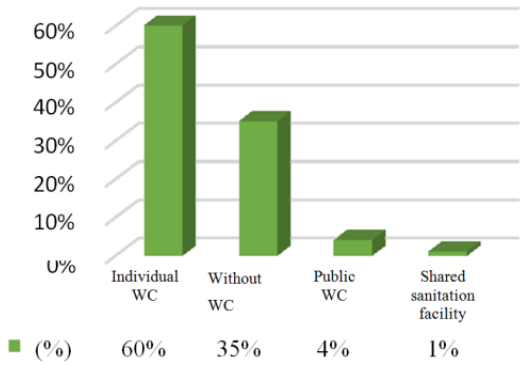

Figure 6. Ownership of wastewater facility

For private toilets, as much as 60% of them distribute domestic wastewater using non-waterproof cubluk. Cubluk will be permanently closed with soil when it is full and will replace it by digging new cubluk holes as new waste water reservoirs; replacing cubluk is usually every 15 years. From 100% of respondents, all of them distribute used washing water to the ditch.

Need for Wastewater Facilities

The need for facilities and infrastructure from the questionnaire results from 100% of respondents in the study area is known that 57% of respondents need wastewater facilities and infrastructure.

Determination of the Location of Domestic Wastewater Facilities

Mapping of the Plan of Wastewater Treatment Plant location

Location planning for wastewater treatment system services based on the results of a sanitation risk assessment. The location of the domestic wastewater treatment plant chosen is the result of a field survey taking into account the availability of land (Setiawati, 2017).

a. Selected RW planning location

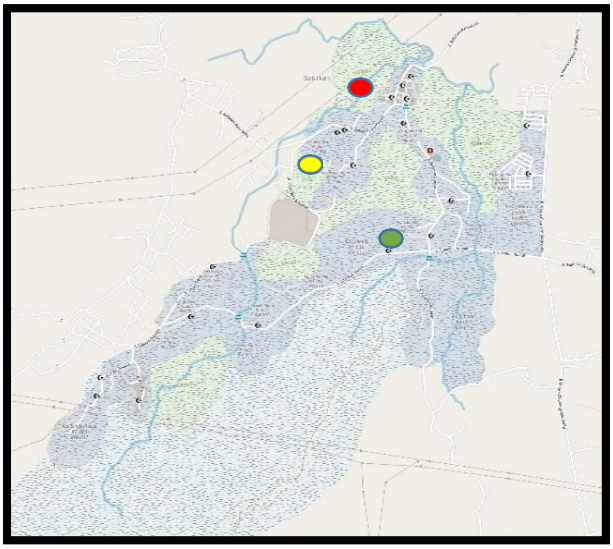

Figure 7. Map of the planning location

b. Area of RW 02

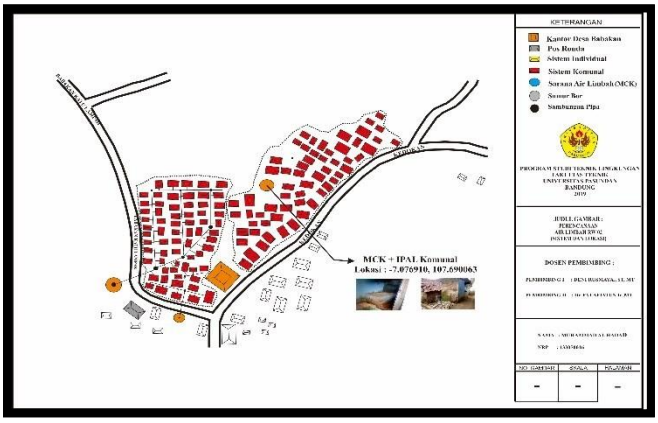

Figure 8. Location planning RW 02

Note : WWTP location

Number of HH: 214 (1 KK 5 people), SSV or sub-sub village (SSV) SSV01: 91KK (with problems), SSV 02: 81KK (no problem), SSV03: 42KK (with problems).

c. Area of RW 05

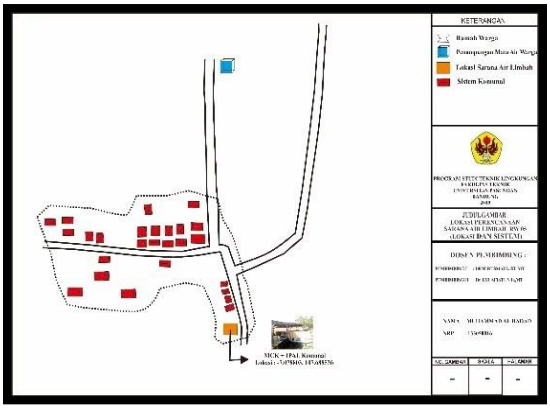

Figure 9 Planning Location of RW 05

Note : Location of WWTP

Number of households (HH): 150 (1 Kk 5 people) SSV01: 56 KK (no problem), SSV02: 67KK (no problem) SSV 03: 27KK (with problem).

d. Area of RW 10

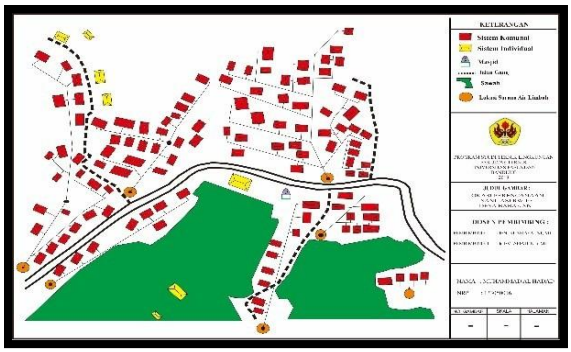

Figure 10 Planning Location of RW 10

Note: Location of WWTP

Number of HH: 89 (1 KK 5 people) SSV01: 19KK (with problem), SSV02: 34KK (with problem) SSV 03: 36KK (with problem)

Selection of Wastewater Technology Options

Things taken into consideration in selecting a domestic wastewater treatment system according to the Guidelines for Urban Wastewater Management of the Ministry of Kimpraswil in 2003 are based on factors of population density, existing water sources, and groundwater level depth, and the ability to finance (Hasbiah et al., 2019).

Based on these factors, processing system selections are made by comparing the advantages and disadvantages.

Selection of individual, communal or semi-communal systems is determined based on local conditions, population and socio-economic conditions. Communal and semi-communal systems can be applied to people who do not have private latrines and low economic levels (Rusmaya et.al, 2019).

Based on the results of the questionnaire analysis and the location survey of the suitable wastewater treatment system is the On-site system to be implemented in Babakan Village. The main consideration is the situation and conditions where technological capability and community financing are still low.

The considerations mentioned above, it is recommended to implement a communal system in the form of communal latrines + communal septic tanks and construction of public toilets + communal septic tanks.

The technology options chosen are Anaerobic Biofilter and stick tank. Anaerobic Biofilter has the advantages of removing high organic matter, relatively small land requirements, and low operating costs while the septic tank was chosen because it does not cause odors and flies, the required land area is not much, easy management, investment and operation costs are quite low. , the resulting sludge is small, does not require electricity and materials are easy to obtain. This condition is very suitable for the condition of the community with a low economic level.

The following is a plan for wastewater facilities and infrastructure.

Table 6. Domestic Wastewater Treatment Technology

No	Location	Technology Option
1	RW02/SSV 01	Biofilter An-aerobik
2	RW02/SSV 03	Toilet, Communal Septic Tank
3	RW 05/SSV01	Toilet, Communal Septic Tank, Retention Area
4	RW 10/SSV01	Communal Septic Tank
5	RW10/SSV02	Communal Septic Tank
6	RW10/SSV03	Communal Septic Tank

Conclusion

Based on the description and explanation of the results of research in the Babakan village study area regarding domestic wastewater treatment facilities, it can be concluded as follows:

- The survey results conducted by Babakan Village show that access to wastewater facilities is still very minimal. This is shown because many people do not have private latrines and proper domestic waste treatment.
- Based on the weighting and scoring, the location in RW 02, RW 05 and RW 10 is the location for the planning study.
- Economic factors are the main burden for the community to build wastewater facilities, plus the lack of public awareness of environmental health. There are still many people who practice defecation and the use of cubkuk which has the potential to pollute the environment.

The technology options used for planning are anaerobic biofilter and communal septic tank. This condition is very suitable for the condition of the community with a low economic level.

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COMMUNITY-BASED ORGANIC WASTE PROCESSING USING BSF MAGGOT BIOCONVERSION

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Abstract

Organic waste is the largest composition of waste generated by the people of Indonesia, which is around 50-60%. This type of waste, especially food waste, is easy to smell if it is stored for too long so that it has the potential to pollute the environment. On the other hand, organic waste has good nutrients that can be generated, including through BSF (Black Soldier Fly) maggot bioconversion treatment. The BSF maggot bioconversion method is a method of processing organic waste which is carried out by converting organic matter into other products that are useful and have added value by utilizing biological processes from microorganisms and enzymes. Organic waste treatment with this method is generally carried out on a community-based basis and is integrated with the development of agriculture, fisheries and animal husbandry, because maggot cultivation produces commodities of economic value such as compost and maggot larvae. Compost contains very good nutrients so that it can be used for organic farming and maggot contains high protein that can be used for animal feed and fisheries. The implementation of this program was piloted in the boarding school community, namely the Az-Zakaria Islamic Boarding School which is managed by the Az-Zakaria Islamic Education Foundation (YPI) in Sindangbarang Village, Jalaksana District, Kuningan Regency. The result of this implementation is the formation of a new group of entrepreneurs engaged in the cultivation and utilization of BSF maggots.

Keywords: *Bioconversion, BSF Maggot, Organic waste*

Introduction

Sindangbarang village is one of the villages located in Jalaksana District, Kuningan Regency, West Java Province which has a population of about 4040 people, most of whom have farmers' livelihoods. In the conditions of the Covid-19 pandemic all is restricted, so that economic activity becomes hampered, so farmers cannot sell their agricultural products. The decline of the economy has an impact on the food crisis, especially for the lower society.

This is in agreement with the statement of the Governor of West Java, Ridwan Kamil, who stated that West Java's prediction in 2021 will experience a food crisis caused by the closure of imports from exporting countries related to the COVID-19 pandemic (Radar Bogor, December 4, 2020). In addition to having an effect on the economy, the COVID-19 pandemic also has an impact on the world of education that still has to run by following the provisions of New Habit Adaptation (AKB).

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The main problem faced by the community today is the lack of knowledge of organic waste management properly, in addition to the economic resilience of students, especially in the current pandemic, many students parents are affected by the Covid-19 pandemic. Therefore, students is required to live independently by relying on the resources around boarding school. In fact, there are currently efforts that can be done with very limited methods and scales, ranging from agriculture to fisheries. However, this potential has not been managed to the fullest. This Community Service activity is carried out to play a role in solving the problems faced by community by providing solutions on ways and/or technology both to process organic waste and utilize the potential of waste so that it becomes a new entrepreneur by turning organic waste into other useful products and adding value to them.

The paradigm of society often considers waste as waste material produced from human activities discarded because it is no longer used or considered no longer useful (Tchobanoglous, 2002 in Satori, 2018). By viewing waste only as waste, then without good management waste can pollute the environment, disrupt environmental health, reduce comfort and aesthetics. In the new paradigm, waste is not only seen as wasted material, but also as a resource. Among the waste materials there is the potential for resources that can be recovered (Satori, 2014). Organic waste can be converted into compost in a variety of composting methods. One of the techniques of composting organic waste is with the bioconversion of maggot BSF (Black Soldier Fly). Bioconversion is an ongoing process that utilizes insect larvae to transform organic waste. Furthermore, the larvae of such insects convert nutrients from waste and store them as biomass (Leong et al, 2016). Organic waste is converted by the process of biotransformation into organic matter consisting of polypeptid containing proteins, lipids, peptides, amino acids, chitin, and vitamins (Liu, C., Wang, C., Yao, H, 2019). Therefore, BSF maggot flies are considered non-pest and beneficial insects. Insects are considered an important source of protein for the 21st century (Rui, M. et al, 2017).

The use of Maggot BSF Bioconversion is very profitable and promising as an organic waste processor. BSF larvae can be used as a source of protein for animal feed such as catfish and chickens. BSF larvae themselves contain 40-50% protein including essential amino acids that can be used as a substitute for fish meal and soy pulp in animal feed mixtures (Wardhana, 2016). Another advantage obtained from Bioconversion Maggot BSF is a liquid organic fertilizer that has a high amino acid content and compost. Therefore, BSF Larva bioconversion is an attractive waste recycling technology that generates added value, especially for low-and middle-income countries. In addition to producing waste reduction, products in the form of prepupa, animal feed, this also opens up new economic opportunities for small entrepreneurs in developing countries (Nguyen et al, 2015).

Research Methodology

The implementation of bioconversion to the community will be carried out using learning by doing methods, where bioconversion communi-cation is carried out while carrying out the work. Based on the analysis of potential, the main problems faced, and external targets, the solution is to provide training on organic waste processing by using boarding school-based BSF maggot bioconversion and entrepreneurial debriefing for students, as well as providing assistance for organic waste management practices with BSF maggots and creating new boarding school-based entrepreneurial groups. The stage of community service activities can be described as follows:

1. Stage 1, initial or preliminary survey to partner premises aimed at ensuring the availability of venues for the application of

Maggot BSF bioconversion. In addition, there is also a calculation of organic waste so that bioconversion can be optimally useful.

2. Stage 2, the preparation stage of tools and materials. The preparation of all components of this tool is carried out directly in the partner's place.
3. Stage 3, training and mentoring to participants on organic waste processing procedures with Maggot BSF bioconversion by the team, which began with a pretest using questionnaires to find out the participants' initial knowledge.
4. Stage 4, monitoring evaluation, namely by looking at the results of training and mentoring both in the implementation and knowledge of participants through the dissemination of the 2nd questionnaire.

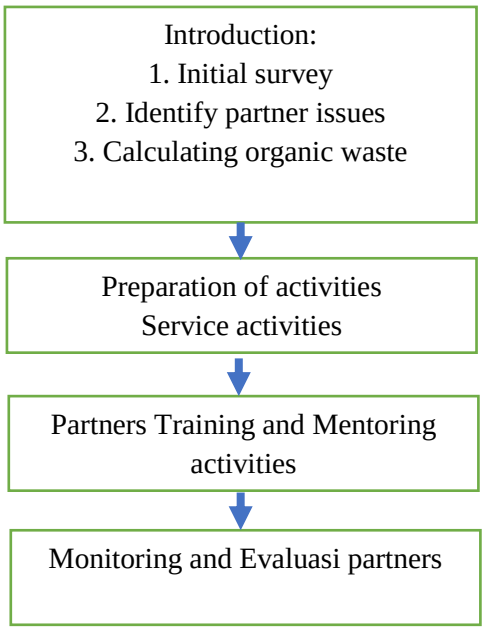

Figure 1. The stage of community service activities

Result and Discussion

Base Line Survey

The survey was conducted by spreading questionnaires to all participants. Questionnaires are divided into 3 groups, namely: (a) knowledge, (b) attitude, and (c) behavior (practice). The purpose of the survey is to find out how their knowledge, attitudes and actions are related to the processing of organic waste. The results of the survey both before and after the assistance are summarized in Tables 1, 2, and 3.

Important note from the results of the participants' survey who participated in the training is that in knowledge the participants are generally quite good, for example about the types of waste, including garbage that includes organic, processing organic waste into compost and others. However, sufficient knowledge cannot guarantee that daily attitudes and behaviors are in accordance with his knowledge. The attitude of those who agree to process organic waste is about 28%, and behavior in waste processing is still less about 4% which is always consistent, 28% often do and 48% sometimes do organic waste processing when there are already facilities. The public knows how to sort but it is not yet certain to do the sorting. Likewise, people know the processing of organic waste into compost but not necessarily they do composting, and others.

Table 1. Knowledge

Numb.	Statement	Result			
		Before		After	
		Don't Know	Know	Don't Know	Know
1	About waste management with 3R pattern	24%	76%	100%	0%
2	How to sort the trash	72%	28%	100%	0%
3	How to make compost by utilizing organic waste (kitchen waste, leaves, leftovers)?	72%	28%	100%	0%
4	Az-Zakaria Boarding school will create an organic garden	40%	60%	100%	0%
5	In the Boarding school area will be made "waste processing with Maggot BSF" as a means of processing organic waste into compost.	68%	32%	100%	0%
6	Garbage that comes from the kitchen or yard such as leaves is organic waste.	68%	32%	100%	0%
7	Organic waste such as food waste and leaves can be processed into compost?	64%	36%	100%	0%
8	Garbage such as neon/used lights, used battery stones, pampers, pads is hazardous and toxic garbage?	76%	24%	100%	0%
9	Inorganic types of waste such as metals, plastics, paper can be recycled into certain products?	72%	28%	100%	0%
10	Packaging waste such as coffee wraps, plastic bags, etc. can be processed into craft products?	72%	28%	100%	0%
11	Burning garbage is prohibited under Law No. 18 of 2008.	84%	16%	92%	8%

Table 2. Attitude

Numb.	Statement	Result				
			Strongly Agree	Agree	Disagree	Strongly Disagree
1	I prefer if waste management in the home environment is done by local residents/neighborhood/officers alternately/together to the temporary shelter rather than done by janitors.	Before	24%	60%	16%	0%
		After	56%	40%	8%	0%

Numb.	Statement		Result			
			Strongly Agree	Agree	Disagree	Strongly Disagree
2	I would rather have waste management done by being transported and dumped into landfill all by janitors rather than partially processed either alone or collectively on neighborhood.	Before	20%	16%	36%	28%
		After	32%	20%	20%	8%
3	I would rather put mixed garbage in one container than be sorted mainly between wet (organic) and dry (inorganic) waste.	Before	8%	36%	16%	40%
		After	28%	40%	20%	12%
4	I would rather put organic waste in the nearest biopore/composter/other composter than throw it in the front trash of the house.	Before	16%	28%	56%	0%
		After	44%	48%	24%	0%
5	If I have a yard with lots of trees, then I would rather bury a fallen leaf than burn it in the yard/put it together with other garbage.	Before	28%	64%	8%	0%
		After	56%	44%	4%	0%
6	I would rather keep leftover waste in a separate place than put it together with other garbage because it gets the other trash wet.	Before	28%	64%	8%	0%
		After	56%	48%	0%	0%

Table 3. Behavior (Practice)

Numb.	Statement		Result			
			Always	Often	Sometimes	Never
1	I store waste in a separate manner (organic, inorganic and hazardous and toxic substance) at home so that waste facilitates in the recycling process both by myself and done on neighborhood and regional scales.	Before	27%	0%	42%	31%
		After	32%	40%	20%	8%
2	I swept and collected trash from the street in front of my house	Before	42%	0%	58%	0%
		After	40%	32%	28%	0%
3	Me/my family pays the garbage dues/levy through neighborhood every month.	Before	28%	0%	52%	20%
		After	40%	36%	16%	8%

Numb.	Statement	Result				
			Always	Often	Sometimes	Never
4	Garbage that comes from the kitchen and garden is processed by itself either using biopore, compost or put into a brick composter.	Before	4%	4%	11%	81%
		After	4%	28%	48%	24%
5	I store plastic waste / cans / cardboard that is still good to be reused or to be sold to junkyards	Before	56%	12%	4%	28%
		After	60%	12%	12%	16%
6	My family/my family reuses used newspaper/magazines for wrapping or for other purposes	Before	42%	0%	58%	0%
		After	48%	20%	28%	0%

Training

The training provided to partners (students and the community around boarding school) is organic waste processing training with BSF maggot bioconversion techniques (BSF maggot house construction), entrepreneurial debriefing, and utilization of compost and maggots for agriculture and fisheries. This training is followed by students and the surrounding community with learning by doing methods.

Figure 2. Building Maggot BSF House

Figure 3. Providing material by service team

Figure 4. Practice of utilizing Maggot BSF for livestock and fisheries

Implementation of Mentoring

Evaluation the results of mentoring is carried out by spreading questionnaires back to participants who participate in training and mentoring, and reviewing the situation in boarding schools to see if there are changes or not after community service activities. Based on the results of the evaluation through the dissemination of questionnaires shown in Tables 1, 2 and 3, there was a change in aspects of knowledge, attitudes and behavior. Some aspects that stand out are the following aspects:

1. Participants' knowledge of waste management with 3R pattern increased considerably from 24% to 100%
2. Participants' knowledge of waste coming from the kitchen or yard such as leaves is organic waste increased from 68% to 100%

Establishment of an Entrepreneurial Group

One of the targets that want to be achieved from this community service activity is the formation of a new entrepreneurial group. This is done to maximize the bioconversion of organic waste with BSF maggots so that it can be a source of income for students and the community around the boarding school. The formation was carried out in deliberation so that the team was formed at the Az-Zakaria boarding school. The team consists of several fields, including maggot cultivation, livestock farming, fisheries, organic farming, and marketing. To further strengthen the existence of this team is being submitted to the Village, in order to get a statement letter and approved by the Village Head of Sindangbarang.

Conclusion

From the community service activities that we have completed, then we can conclude that the garbage that has been an environmental problem in the Az-Zakaria boarding school of Sindangbarang Village, Jalaksana Kuningan, can be converted into products that can be utilized and are economically valuable through Maggot

BSF bioconversion technology. The economic potential that can be developed and become a new entrepreneur based on boarding schools is catfish cultivation, chicken farming and the sale of maggot larvae (fresh maggots) and kasgots that can be utilized for plantations or sold to the community. The economic potential that can be developed through the cultivation of BSF maggots can be an alternative business in the pandemic period. In general, participants' knowledge about organic waste processing, especially kitchen waste before maggot bioconversion training is quite good. While attitudes and behaviors about the management of new kitchen waste increased after participants conducted training and mentoring. This is realized when monitoring is carried out, 75% of organic waste in the environment around boarding schools can be resolved.

Recommendation

During training and mentoring, of course, we get various important information, especially related to the sustainability of the program. For this reason, we propose the following suggestions:

1. Local governments, especially the village government, should be able to facilitate the growth of maggot cultivation in the community.
2. The government should be able to help market access and capital.
3. The community should be required to sort waste into at least 3 groups, namely organic waste, inorganic waste and hazardous and toxic substance waste.
4. The government should socialize continuously and continuously, especially related to the sorting of waste and processing organic waste into compost.

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OPERATIONAL OF SOLID WASTE HANDLING IN SUBANG DISTRICT

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Abstract

The operational technique of waste management in Subang Regency uses simulations in the form of three scenarios, namely scenario-1 is a scenario that has been running so far (existing), in which recycling activities have not yet developed, so it is practically only a collection-transport-disposal system. a better scenario than Scenario-1, in which there are already recycling activities in the TPA, both in the formal and informal sectors (scavenging) and Based on the projections for each scenario above, it is found that Scenario-3 is a moderate scenario, because: the volume of waste transportation to the landfill is the minimum, the volume of waste that must be removed to the landfill is also the minimum which automatically has the minimum volume of landfill among the 3 (three) proposed scenarios. This scenario makes the transportation system efficient but requires a more significant investment to facilitate facilities and infrastructure. However, this is not the case in Scenario-1. In this scenario, the budget needed to procure facilities and infrastructure is relatively lighter than the needs in the other two scenarios.

Keywords: *Composting, Solid Waste Operational, Subang Regency*

Introduction

Most people still view waste as useless waste, not as a resource that needs to be utilized. The community in managing waste still relies on the end-of-pipe approach; namely, waste is collected, transported, and disposed of at the final waste disposal site. In fact, heaps of waste with large volumes at the landfill site can release methane gas (CH4) which can cause greenhouse gas emissions and contribute to global warming. For the landfill to be decomposed through natural processes, it takes a long period and requires handling at a considerable cost.

The new paradigm that must be embraced in our Waste Management System, it is time for local governments to change their mindset to an environmental nuance. It is time to apply the concept of integrated waste management. Minimizing waste at the source by maximizing recycling and waste utilization is a paradigm that must be embraced and become the spirit of developing the solid waste system in Indonesia.

To be able to realize the vision of developing a solid waste management system, several missions are formulated as follows:

1. Reducing waste generation in the context of sustainable waste management
2. Improving the reach and quality of waste management system services
3. Empowering the community and increasing the active role of the business/private sector

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4. Improve the management and institutional capabilities in the solid waste management system following the principles of Good and Cooperative Governance.
5. Mobilize funds from various sources for the development of solid waste management systems
6. Enforce the law and complement laws and regulations to improve the solid waste management system. Presidential Decree No. 97 of 2017 on National Policies and Strategies for Household Waste Management and Household Waste is implemented from 2017 to 2025 containing: 1. The direction of the policy of reducing and handling Household Waste and Household Waste Type 2. Strategies, programs, and targets for reducing and handling Household Waste and Household Waste.

The policy directions for reducing and handling household waste and similar household waste include improving performance in the areas of:

1. Reduction of household waste and similar household waste
2. Handling household waste and similar household waste.

Reduction of household waste and similar household waste is carried out through:

1. Limitation of the generation of household waste and similar household waste
2. Recycling of household waste and similar household waste
3. Reuse of household waste and similar household waste

The handling of household waste and similar household waste is carried out through:

1. Sorting
2. Collection
3. Freight
4. Processing
5. Final processing

Strategies for reducing household waste and similar household waste include:

1. Formulation of norms, standards, procedures, and criteria in reducing household waste and similar household waste
2. Strengthening coordination and cooperation between the central government and local governments
3. Strengthening the commitment of executive and legislative institutions at the center and regions in providing budgets for reducing household waste and waste similar to household waste
4. Capacity building of leadership, institutions, and human resources to reduce household waste and waste similar to household waste
5. Establishment of information system
6. Strengthening community involvement through communication, information, and education
7. Implementation and development of incentive and disincentive systems in reducing household waste and similar household waste
8. Strengthening the commitment of the business community through the implementation of producer obligations in reducing household waste and waste similar to household waste

The strategies for handling household waste and similar household waste are:

1. Preparation of norms, standards, procedures, and criteria

2. Strengthening coordination and cooperation between the central government and local governments
3. Strengthening the commitment of executive and legislative institutions at the central and regional levels in providing budgets for handling household waste and waste similar to household waste
4. Capacity building for leadership, institutions, and human resources in handling household waste and similar household waste
5. Establishment of information system
6. Strengthening community involvement through communication, information, and education
7. Implementation and development of investment, operational, and maintenance schemes
8. Strengthening law enforcement
9. Strengthening the involvement of the business world through partnerships with the central government
10. Application of technology for handling household waste and waste similar to household waste that is environmentally friendly and effective
11. Implementation and development of incentive and disincentive systems in handling household waste and similar household waste.

Targets for reducing and handling household waste and similar household waste include:

1. Reduction of household waste and similar household waste by 30% (thirty percent) of the generation rate of household waste and household waste similar to household waste prior to the national policy and strategy for reducing household waste and household waste similar to household waste in 2025
2. Handling household waste and waste similar to household waste by 70% (seventy percent) of the generation rate of household waste and waste similar to household waste before the existence of national policies and strategies for handling household waste and waste similar to household waste in 2025.
3. In addition to the problem of increasing waste volume, the Subang Regency Government is currently also facing various problems related to waste management, in the form of limited operational costs and infrastructure for its management. The amount of budget issued by the Subang Regency Government to handle waste.

Research Methodology

The evaluation process of the Subang district waste management system is carried out using quantitative analysis methods, namely comparing secondary data and comparative indicators of Presidential Regulation No. 97 of 2017. Secondary data shows the existing condition of the achievements of waste management services that the Subang Regency government has carried out. The results of secondary data analysis are presented in a mass balance. Comparative indicators are achievement standards that must be met in the waste management system. The comparison results show the value that must be fulfilled in the percentage of solid waste services. So from these results it can be concluded that the current problems faced by the Subang Regency waste management system are a reference in developing a solid waste service system.

Result and Discussion

Subang Regency waste management service planning is based on the burden of waste

problems faced in the current condition until the next 10 years, namely in 2030. The burden of waste management from 2021 to 2030, shown in volume and weight units is as in Table 1.

Table 1. The Load of Waste Management

Year	Population estimated	Waste Generated		
		m^3/ day	m^3/ year	ton/ year
2021	1,619,779	6,074	2,217.073	443.415
2022	1,633,366	6,125	2,235.670	447.134
2023	1,646,953	6,176	2,254.267	450.853
2024	1,660,540	6,227	2,272.864	454.573
2025	1,674,127	6,278	2,291.461	458.292
2026	1,687,714	6,329	2,310.059	462.012
2027	1,701,301	6,380	2,328.656	465.731
2028	1,714,888	6,431	2,347.253	469.451
2029	1,728,475	6,482	2,365.850	473.170
2030	1,742,062	6,533	2,384,447	476,889

Judging from the large volume of waste that must be handled, Subang Regency is categorized as having a relatively heavy load. Moreover, with limited infrastructure and facilities as well as costs, the burden becomes heavy.

The success of a city/district waste management system is often seen from environmental cleanliness in urban areas in general. This scoring system is identical to the level of transportation of waste to the landfill. The higher the waste transported to the landfill, the cleaner the city/regency will be. The cleaner the city/regency, the more successful the City/Regency Government will be and can be felt by the community. However, this is actually only an indicator of the effectiveness of the system and can be said to be a quasi-judgment. There are still many assessment factors that should be the concern of the current City/Regency Government in waste management. Currently the demands are increasing, not only clean cities/districts but even garbage handled properly so that it does not have an impact on the environment, have begun to arise.

As for the current Subang Regency, the impact of not handling waste ideally (up to 100%) by the Regency Government has begun to be felt. Dirty conditions in public places, that is the target of the District Government in the short term. However, it must be realized that at this time the application of the principle of saving the environment in waste management has become the mission and vision of the Regency Government. The target of clean districts with high levels of waste transportation must be balanced with efforts towards the application of the 3R (Reduce-Reuse-Recycling) concept. For this reason, in the waste management service plan for the next 10 years, 3 (three) service scenarios have been developed. The scenario emphasizes that the service burden for management actors is proportional. The management actors in question are formal managers, namely DLH (environmental agency), private managers, scavengers who are termed SIDUS (Waste Recycling Information System), independent management by the community.
Subang Regency DLH service targets are basically set based on the ability of the Government to allocate the budget every year. Bearing in mind, the size of the service to be provided will have consequences for the costs that must be provided by the Regency Government.

As for the presence of non-government managers, in waste management in Subang Regency, it is based on currently developing patterns. The ability of these parties to contribute to the improvement of services will depend on the Government's efforts and their

facilitation. People with small capital currently dominate the presence of private managers in Subang Regency. They run a management business as an alternative livelihood. But among them, there are also those with moderate capital. Their existence needs to be appointed, seen from the achievement of relatively good work efficiency. However, their existence needs to be regulated and legally bound by the government. In an effort to promote the existence of this group, active facilitation from the government is needed. They are reached and invited to partner, with partnership patterns that have been prepared (Kawung and Tamod, 2009).

The presence of scavengers, garbage collectors in Subang Regency (SIDUS) should not be ignored. Their presence should be raised and integrated into the developed system. However, based on experience, the treatment of these groups is not to make them a formal system or formalization of informal groups, but only to facilitate their existence. The government provides opportunities so that their performance can improve, by setting up facilities at their work locations, namely at TPS and TPA. Efforts to arrange TPS in Subang Regency are conditioned to also prepare their facilities. SIDUS's performance is basically very dependent on the perpetrators and they are human workers, in addition, they also work out of necessity, so performance will be greatly influenced by these factors. Thus, the magnitude of their contribution to the increase in handled waste is considered the same for every policy on other aspects.

In the waste management system, the community is generally placed as a waste generator, so that they are the object of system services. This concept is no longer appropriate in the era of community empowerment as it is today. As the cause of the problem, the community should be the main character in solving it. Therefore, community involvement from an early age, namely since the waste management system in Subang Regency has grown, is a strategic action pattern.

Based on the potential possessed by each of the existing stakeholders, the Subang Regency Waste Management System can be run in 3 (three) scenarios. The three scenarios determine the proportion of the management burden for formal institutions.

Furthermore, the remaining waste that is not managed by formal institutions, is handed over to other stakeholder groups consisting of:

- The community as the generator by applying the principle of self-management with a target of minimizing waste transported to the landfill or even reaching 'zero waste'.
- Community management actors, or private managers, who are currently present in Subang Regency.
- Community scavengers (SIDUS).

It is proposed that there are 3 (three) scenarios for waste management, namely:

1. Scenario A: business-as-usual scenario
    - There are no 3R activities at the source or in the area where the waste originates
    - Waste that is served, from the temporary dumping ground is transported entirely to the landfill
    - All waste that is transported to the landfill is completely backfilled/buried

2. Scenario B: moderate scenario
    - There are no 3-R activities at the source or in the area where the waste originates
    - Waste that is served, from the temporary dumping ground is transported entirely to the landfill

- Some of the waste that is transported to the landfill is then processed into compost and other 3R activities, some of the waste along with the composting residue is taken to the landfill area to be filled/stocked. The percentage of waste transported to the landfill, and then processed into compost, is assumed to be 5% in 2021, and will increase to 10% in 2030.

3. Scenario C
   - 3R activities start at the source of the waste or at the temporary dumping ground or in the area in the service area. The assumption is that in 2021 as much as waste is served, undergoing a 3R process of 5%, and in 2030 it will be 10%
   - Other waste and residue from 3R activities, transported from temporary dumping ground to landfill location
   - Some of the waste that is transported to the landfill is then processed into compost and other 3R activities, some of the waste along with the composting residue is taken to the landfill area to be filled/stocked. The percentage of waste transported to the landfill, and then processed into compost, is assumed to be 5% in 2021, and will increase to 10% in 2030.

Based on the existing waste data obtained regarding the current level of waste transportation services to the landfill in Subang Regency, a service improvement scenario was developed for the 10-year planning period (years 2021-2030). Existing data on the level of data waste services for 2019-2020, which reaches 50%. With the plan for structuring waste facilities and infrastructure, including improvements to the operational technical system for municipal waste management, the service level can be significantly increased at the beginning of the planning year, reaching 57.5% at the end of the first stage (5 years) and increasing to 80% in the first five years. the end of the second stage (5 second year).

Table 2. Service Percent Increase

Year	Estimated Population	% Served
2021	1,619,779	57.5
2022	1,633,366	60
2023	1,646,953	62.5
2024	1,660,540	65
2025	1,674,127	67.5
2026	1,687,714	70
2027	1,701,301	72.5
2028	1,714,888	75
2029	1,728,475	77.5
2030	1,742,062	80

Based on existing data and observations, it is shown that in the study area no significant recycling or composting efforts have been found at the source or area level carried out by both the community and other waste producers. Therefore, data on waste minimization (reduction) in 2018 in this report is listed at 0%. The ideal scenario proposed above will take into account the factor of minimizing waste at the source, because the success of waste management at the source level plays an important role in the success of municipal solid waste management. In the early planning year (2021), it is assumed that there will be a will from the Regional Government and the emergence of public awareness of recycling or composting efforts at the source or regional level, and it is assumed that the minimization of waste at the source (before transportation) reaches 5%. The increase in waste minimization at each planning stage (5 years) is also assumed to be the same at 2.5%.

Table 3. Waste Loaded

Year	Scenario – A (business-as-usual)		Scenario – B (Moderate)		Scenario – C (Ideal)	
	m^3/year	ton/year	m^3/year	ton/year	m^3/year	ton/year
2021	2,106,219	421,244	1,995,365	399,073	1,773,658	354,732
2022	2,123,886	424,777	2,012,103	402,421	1,788,536	357,707
2023	2,141,554	428,311	2,028,840	405,768	1,803,414	360,683
2024	2,159,221	431,844	2,045,578	409,116	1,818,291	363,658
2025	2,176,888	435,378	2,062,315	412,463	1,833,169	366,634
2026	2,194,556	438,911	2,079,053	415,811	1,848,047	369,609
2027	2,212,223	442,445	2,095,790	419,158	1,862,925	372,585
2028	2,229,890	445,978	2,112,528	422,506	1,877,802	375,560
2029	2,247,558	449,512	2,129,265	425,853	1,892,680	378,536
2030	2,265,225	453,045	2,146,003	429,201	1,907,558	381,512

Management Operating System

Waste management operations in Subang Regency within the next 10 years are planned as follows:

1. Storage, collection and transport at the source is directed towards a segregated system. Waste is divided into 2 (two) types, namely: organic and inorganic waste. The sorting process for the first five years was only introduced, so it was oriented that a new sorting system would be formed in the last years of planning.
2. SIDUS carries out the recovery of inorganic waste that has the potential to be recycled at temporary dumping ground and landfill. DLH provides a means for the mechanism to run more optimally.
3. The operation of collecting waste from houses to temporary dumping ground is carried out by the community independently by forming an organization at the neigborhood level or appointing a private manager.
4. Transportation to the landfill is planned to use Arm Roll with steel containers. The consideration is to use Arm Roll type fleets instead of Compactors because of efficiency and operational and maintenance costs. Arm Roll is more efficient because generally the distance from temporary dumping ground to landfill Ciangir, Tamansari District in Tasikmalaya City is not too far, so there is no need for a compaction process in transporting waste. In terms of maintenance costs, Compactors require high costs, considering that there is a compaction process that causes waste with high organic content to be released, it is prone to rusting if not carried out carefully.
5. Waste composting is carried out by DLH in partnership with the private sector or other parties. Directed to apply regional-scale composting. The composting process is

carried out as an effort to minimize waste buried in the landfill, not just to seek economic benefits. Therefore, compost production will be returned to people who are interested in using it and will also collaborate with other parties or agencies or agencies related to the use of compost products as a substitute for chemical fertilizers, for example the City Parks Service or the Agriculture Service.

6. The final disposal applies a controlled landfill system, leading to improved operations towards a sanitary landfill system in 2025 (end of stage 1).
7. The Panembong landfill is maintained and opportunities for cooperation with outside parties are sought. To increase the service life of the landfill, it is recommended to do landfill mining.
8. Incinerator as a waste destroyer is not recommended for use in Subang Regency, besides this technology is a high-cost technology, there needs to be an in-depth feasibility study for its use, considering that the composition of burnable waste in Subang Regency is still too small.
9. However, incinerators are required in handling hospital medical waste. It is hoped that every hospital in Subang Regency in the next 2 years has adequate medical waste management with the existence of individual incinerators or joint incinerators between several hospitals.
10. The waste management plan is based on the minimum amount of waste to be transported and disposed of to the landfill. The recycling of inorganic waste is carried out by empowering SIDUS, while the minimization of organic waste is carried out by carrying out composting.
11. For 10 years, the Subang Regency waste management system has been directed to handle domestic waste, namely waste originating from human activities, and not waste from a production process or waste resulting from medical activities.
12. Industrial waste, or waste resulting from the production process, is the responsibility of every institution or individual and or agency that produces it and is not the responsibility of DLH. This has been regulated by law on the management of hazardous and toxic substances (B3) from industry to be managed by a party appointed by the government.
13. The management of household hazardous and toxic substances (B3) waste, such as Insecticide packaging cans, used batteries, etc., must gradually become the responsibility of the Government. However, in its management, the 'back to producer' concept must be applied. This means that the Government is responsible for the process of recovering the waste from the city's waste generation, then the management and destruction must involve producers. Due to the long chain of household hazardous waste management systems that must be prepared, in the next 10 years the Subang Regency waste management system has not been oriented to manage it.

Composting

Based on the study of waste composition in Subang Regency, 64.50% of the waste generated in Subang Regency is suitable for composting. The source of organic waste which is quite large apart from the settlement is the market, considering that the market in Subang Regency is still a traditional market. The existing potential can be utilized by recycling organic waste into compost. The compost is a conditioning material (conditioner) loosening agricultural soil and as a means of cultivating plants or fisheries. Agricultural land around

Subang Regency has the potential to absorb the distribution of compost, both for horticultural crops and plantation crops. Compost produced from organic waste processing must have a great opportunity to meet market demand if it has a competitive advantage over similar fertilizers. A type of compost that is commonly used in agriculture and plantations is manure.

However, based on the experience of implementing composting in several cities in Indonesia, the development of a composting system cannot be said to have economic advantages. The benefits obtained are reduced landfill loads which will extend the service life of the landfill and other benefits that are not currently being felt are benefits for saving the environment. Taking this into account, the composting business must be a policy that is not based on obtaining economic benefits.

The problem that often arises from the business of composting municipal waste is the cessation of activities because the manager feels a loss. This kind of thinking should not happen in Subang Regency. The district government must have a strong and high commitment to continue running the composting business by putting aside the desire to obtain economic benefits.

The composting process in the waste management system in Subang Regency in the short term must be considered as a learning process, considering that the DLH Subang Regency has never done it. For this reason, the capacity of the composting process is determined according to the ability at this learning stage of 10 m3 of waste per day, and continues to be increased to reach 100 m3 of waste per day by 2030.

The target of the composting system is to reduce the burden of stockpiling at the landfill and even reduce the burden of transportation operations. For this reason, the composting process should be carried out from the source, with the aim of reducing transportation costs. Alternative composting systems based on the location of the process can be distinguished as follows:

- Individual composting, carried out independently by each waste generator, at home or at the location where the waste is generated. For household waste, composting can be done in the yard if possible. The composting technique that can be done at home is to use the Individual Composter, which will be shown in the next report. With the application of this pattern, the generation of waste that is the burden of collection operations is reduced because 66% of the generation can be reduced by composting. However, promoting this pattern to the community takes a long time and must be programmed. Therefore, within 10 years this pattern will be included in the community empowerment program in waste management.
- Temporary dumping ground scale Communal Composting. In the implementation, the temporary dumping ground location was chosen which had sufficient land area for the composting process to be carried out. Garbage from the collection carts is sorted, then organic waste is composted at the temporary dumping ground, and the rest is transported to the landfill. In the city of Tasikmalaya, currently there is no proper temporary dumping ground to be a location for composting at the same time. For this reason, this model temporary dumping ground is prepared in the plan to add new temporary dumping ground in the next 10 years.
- Communal composting on a landfill scale. In this pattern, composting is done at the landfill site. It is intended that in the landfill there is

an area specifically designated for composting waste or there is a special location separate from the landfill. Given the narrowness of the existing landfill area, it is recommended that this pattern of composting be carried out outside the landfill. However, when the landfill management program has been implemented, a small portion of the landfill can be allocated for the composting process.

The three alternatives above are feasible to be implemented by DLH as a learning process, but the steps that must be taken towards the implementation of a sustainable composting system are as follows:

- Establish a special unit for waste management in a formal institution or DLH
- Prepare a composting work team, which consists of sorting staff, and composting process personnel, as well as post-processing personnel. This work team is prepared by providing training.
- Make a calculation of the cost of the composting process per volume of processing load. For the composting plan in Subang Regency, with a capacity of 10 m^3 per day.
- Determine the location of composting, as well as create a 'deplot'. The criteria for composting locations are as follows:
- The minimum land area is 200 m^2 for 2021. Meanwhile, to be able to accommodate a maximum capacity of 70 m^3 per day in 2030, an area of approximately 1 Ha is needed.
- The location is far from settlements. It is possible to choose a location near a settlement, provided that the community is involved in the development of the plan and in its operation.
- The access road can be passed by an arm roll of 10 m^3.
- The priority of finding a location is near the market, considering that market waste is a priority for composting.

Inorganic Waste Recycling

As in other cities, in Subang Regency, scavengers are still working on recycling inorganic waste together with a network of buying and selling goods that are informally formed. In reducing the burden of waste, the role of scavengers is very important. For this reason, the potential role of scavengers must be empowered by facilitating through the provision of facilities to collect/accommodate the products of their work. The collection facilities are placed at each temporary dumping ground location, shaped so that their presence does not interfere with the routine operation of the temporary dumping ground. Thus, the presence of scavengers will be concentrated at the temporary dumping ground location points. And in the future, with the aim of improving their performance in reducing the burden of municipal inorganic waste, it is necessary to develop an incentive mechanism.

Final Disposal System

Panembong landfill is a landfill to dispose of all Subang Regency waste. The construction and operations are still using an open dumping system, so problems due to environmental impacts will be increasingly sticking out.

Based on the evaluation of the current condition of the landfill, the priority actions needed are:

1. Arrangement of land for landfilling. The technical arrangement is directed towards controlled landfills and even sanitary landfills
2. Prepare facilities and infrastructure for controlling environmental pollution in the form of: facilities for controlling the flow and processing of leachate, pipes for collecting and distributing gas, and infrastructure for

preventing the spread of odors, in the form of building a buffer zone (Oktariadi, 2010).
3. Arrangement of operating facilities in the form of access roads.

All the necessary actions are expensive. In the next 10 years, actions at the landfill will be prioritized for land management in the early stages to a controlled landfill accompanied by construction of optimizing the function of leachate processing ponds, leachate piping, and gas piping.

Landfill Service Plan

- The first stage is the landfill mining business, which is able to increase the availability of the Panembong landfill space. The implementation of mining requires cooperation between various parties. For this reason, a feasibility study for mining the Panembong landfill is needed in the 2021-2022 period.
- The second stage is when mining has been carried out optimally, then an evaluation of the recycling program needs to be carried out to measure its effectiveness and development possibilities. Suppose Subang Regency is consistent in pioneering waste management efforts with composting and SIDUS integration from 2021-2030. In that case, recycling can certainly become the main strategy for waste management in Tasikmalaya City after 2030.

Conclusion

It can be concluded, that:

- From the three scenarios, it can be seen that regardless of the proportion of the management burden assigned to DLH, it still requires the role of the other three stakeholders to achieve the most optimal level of handled waste.
- There are many advantages and disadvantages to each scenario. However, based on the principle of developing a sustainable integrated solid waste management system, Scenario-3 is more appropriate to choose. In this scenario, there is a mechanism for involving all groups that have the potential to assist the government in carrying out its obligations in realizing city cleanliness, both by recycling activities at the source level and at the landfill. In addition, the demands for the government in procuring costs are only high at the beginning of the planning year, and so from year to year are relatively minimum and evenly distributed, because they can streamline transportation costs.

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SUSTAINABILITY ANALYSIS OF THE APPLICATION OF WASTE BANK IN ELEMENTARY SCHOOL WITH A MULTIDIMENSIONAL SCALING APPROACH

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Abstract

Waste banks are one of the waste management that have the potency to reduce the burden of waste in the final processing site. Until now, there is a large number of waste banks to accommodate waste from the surrounding environment. Bandung, as a city that experienced a waste emergency in 2005, has encouraged its citizens to operate waste banks, both school scale, neighborhood and for a larger scope. Bandung City Government also cooperates with several waste banks to conduct several programs to increase public awareness of environmental cleanliness. Waste banks that have been built mostly do not come with good management, so some waste banks are only feasible quickly. The purpose of this study is to obtain a waste bank management model based on existing conditions using the Multidimensional Scaling Method. This method exploring data provides a visual picture of the proximity patterns in the form of similarities or distances between a set of objects. This method will be useful for the formulation of waste bank sustainability recommendations in its marketing strategy and diversification of its business without reducing the essence of waste banks as part of environmental management. The representation of the waste bank that was used as the object of the study was the Raafi Elementary School Waste Bank. Data processing uses Rapfish/Rap-Bash software with multidimensional scale methods. Data processing results are used to formulate the sustainability strategy of waste banks.

Keywords: *Management, Multidimensional scaling method, Waste bank*

Introduction

Waste management in major cities has undergone a paradigm shift since Law No. 18 of 2008 on Waste Management with the main goal to maintain public health by managing waste properly. In addition, the need to change the new paradigm of waste management from the community, where waste as a resource with economic value and can be utilized. Regulation of the Minister of environment Number 13 of 2012 concerning Guidelines for the Implementation of Reduce, Reuse, and Recycle (3R) through waste banks explains that waste banks are places for sorting and collecting waste that can be recycled and or reused that have economic value, and the process involves the community (Yustiani., et al, 2019).

The 3R concept is a new paradigm in consumption and production patterns at all levels by giving the highest priority to waste management oriented to the prevention of waste, minimization of waste by encouraging reusable goods and biodegradable goods, and

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environmentally the application of environmentally friendly waste disposal. The implementation of 3R concerns social issues to encourage changes in attitudes and mindsets towards the realization of an environmentally friendly and sustainable society and concerns proper regulation (management) in its implementation.

Waste banks are now operating in many communities to support 3R program of government waste management. Schools contribute their part by developing and performing the waste banks, mainly for educational purposes. Ar Raafi Elementary School is one of an educational place that conducting waste bank. Although it appears smooth run, waste banks operated in schools sustainability might not be in stable condition. Sustainability of waste bank operation, including by educational purposes need to be maintained (Triana & Sembiring, 2018). This research was carried out to analyze the sustainability of school waste bank operation in Ar Raafi Elementary School by using MDS.

Multidimensional Scaling (MDS) is a statistical analysis to determine the similarities and inaccuracies of variables depicted in geometric spaces. This MDS method was chosen because it is able to provide results thoroughly, quickly and objectively related to aspects that affect the sustainability of waste bank management, making it easier to implement in policy. This method has been widely used to identify the level of sustainability of natural resource management.

Research Methodology

The research method used is the survey method, which is an investigation held to obtain facts and find factual information about environmental, economic, social and institutional from an area. The main data collection techniques through the use of questionnaires and to strengthen and check the validity of the questionnaire results data is complemented by interviews with respondents, field observations, and collection of statistical data/reports, articles, and scientific publications. This research uses a gradual mix method or often called the sequential mixed method (Walker & Baxter, 2019. In this strategy, researchers combine data found from one method with another. Research methods using qualitative methods followed by quantitative methods then end with interpretation (sequential exploratory).

Tools and Materials

The collection of data and information from various sources is done using several ways:

1. Literature studies and secondary data collection. Such as reports, documents, and publications published by relevant agencies and various journals, seminar materials, and previous research related to research topics.
2. Primary data collection. Such as discussion, in-depth interviews, questionnaire filling, and direct observation at the research site.
3. Sampling techniques. In order to dig up information and knowledge (acquisition of expert opinion) determined intentionally (purposive sampling)

Critical Attributes Assignment

Sustainability analysis of waste bank management covers four dimensions, namely: (1) ecology; (2) economic, (3) social, and (4) regulatory and institutional. The ecological dimension focuses on facilities and conditions in the waste bank environment. The economic dimension focuses on the financing aspect in the form of investment cost support and operational costs from the government and private / NGO. The social dimension focuses on aspects of community participation, knowledge, and public perception. The regulatory and institutional dimensions focus on the form of the institution, its legality, and its legal protection.

Data processing was performed by using Rapfish application. The application can evaluate sustainability analysis for many fields (Nababan et al., 2007).

Result and Discussion

Critical Attribute Analysis of Waste Bank Implementation

The results of the evaluation of the implementation of waste banks in Raafi Elementary School using Rapfish showed overall that the sustainability index for 4 dimensions was 59.16 (sustainable). Based on Table 1 it is seen that the ecological dimension has a sustainability index value of 80.02. This value is the highest compared to the other four dimensions of sustainability. While the economic dimension has the smallest sustainability index value of 26.95.

Table 1. Sustainability Analysis in Raafi Elementary School

No.	Sustainability Dimension	Sustainability Index Value (%)		|MDS-MC| (%)
		MDS	MC	Δ
1	Ecology	80.02	79.40	0.62
2	Economic	26.95	29.11	2.16
3	Social	49.88	50.40	0.52
4	Regulatory & institutional	79.78	79.13	0.65
	Sum	**59.16**	**59.51**	

Description:
MDS = Multidimensional Scaling
MC = Monte Carlo
• = delta

The results of Monte Carlo analysis and MDS analysis at the level of 95% confidence obtained the difference in the value of the Sustainability Index of Waste Bank Implementation at Raafi waste Bank in Bandung city < 3%. This means that the resulting MDS analysis model is adequate to estimate the sustainability index value of the Raafi Waste Bank.

In Table 2 displayed the results of the Rapfish analysis obtained the coefficient of determination (R^2) for the sustainability index of Raafi Elementary School Waste Bank between 93%-95% or the value of this coefficient of determination is close to the value of 95-100% and the stress value is less than 25% (0.14-0.17), so that the MDS analysis model obtained has a high accuracy (goodness of fit) to assess the sustainability index of the implementation of Waste Bank at Raafi Elementary School Waste Bank.

Table 2. Sustainability Analysis in Raafi Elementary School

No.	Sustainability Dimension	Stress	Coef. Determination
		S	R^2
1	Ecology	0.1515	0.9385
2	Economic	0.1394	0.9518
3	Social	0.1717	0.9374
4	Regulatory & institutional	0.1519	0.9246

Ecology Dimension

The index of the ordination results for the sustainability status of the implementation of waste banks in the Raafi Waste Bank in Bandung on the ecological dimension, as a whole is 80.02% or in the category either because the value of the ecological dimension index falls into the range of 75.01-100.00 (very sustainable).

Based on monitoring in the field, the ecological conditions around the Raafi Elementary School waste bank are relatively good. The location of the waste bank is very strategic because it is in the school environment so it is easily accessible. The waste bank building is on land bounded by a fence occupying a decent room equipped with adequate waste storage warehouses. So that does not disturb the local environment, although the source of waste is limited because it is located in the school environment. The environmental

conditions of the waste bank encourage this ecological dimension will be sustainable in the future. Sustainability status of ecological dimension of Raafi Elementary School Waste Bank in Bandung City presented in Figure 1.

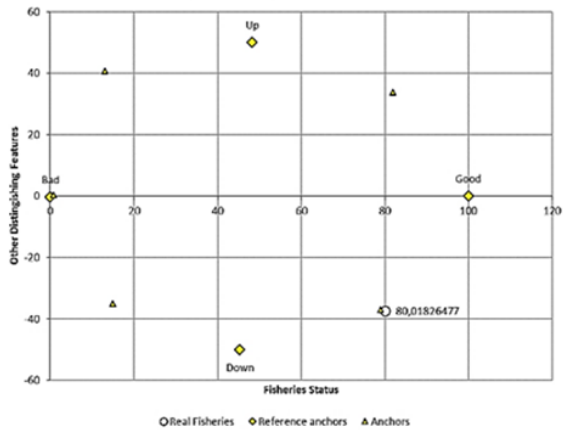

Figure 1. Sustainability Status Index of Ecological Dimensions

Economic Dimension

The index of the ordination results for the sustainability status of the implementation of waste banks in the Raafi Elementary School Waste Bank in Bandung on the Economic dimension, as a whole is 26.95% or in the category is less good because the value of the Economic dimension index falls into the range of 25.01-50.00 (less sustainable).

Based on monitoring in the field, the benefits of the community/customers of Raafi Waste Bank are economically existing but not significant so it cannot be relied upon to meet some daily needs. Likewise, with the benefits obtained by the manager of the waste bank, it is still inadequate so it cannot finance the operations of the waste bank. Based on these conditions, the Raafi Elementary School Waste Bank still relies on the results of waste bank management. Diversification of business from a waste bank has not become a priority.

These conditions encourage this dimension of the economy tends to be less sustainable in the future. The sustainability status of the economic dimension of Raafi Elementary School Waste Bank in Bandung City is presented in Figure 2.

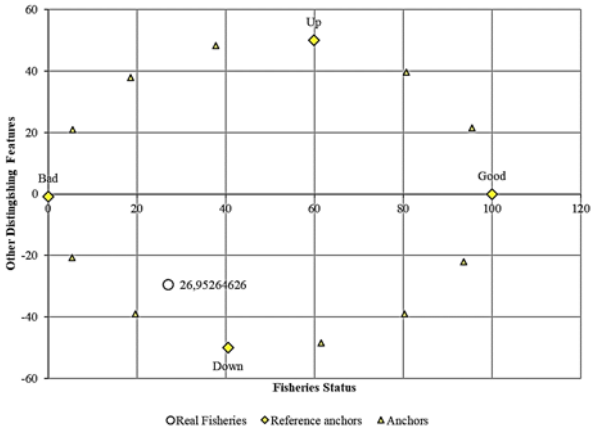

Figure 2. Sustainability Status Index of Economic Dimensions

Social Dimension

The index of ordination results for the sustainability status of the implementation of waste banks in Raafi Elementary School in Bandung on the Social dimension, as a whole is 49.88% or in the category of less good because the value of the Social dimension index falls into the range of 25.01-50.00 (less sustainable).

Based on monitoring in the field, student participation in The Raafi Elementary School Waste Bank Bandung still needs to be improved both at the formation stage, building a school-based waste management system. In addition, the percentage of students involved is still not optimal even though the knowledge is sufficient and perception is quite good, but the continuity of customers in saving has not been consistent. These conditions encourage this social dimension to be quite sustainable in the future. Sustainability status of social dimension of Raafi Elementary School Waste Bank ini Bandung city presented in Figure 3.

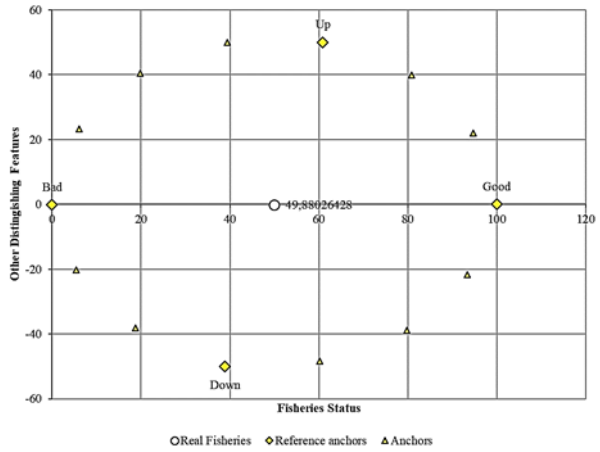

Figure 3. Sustainability Status Index of Social Dimensions

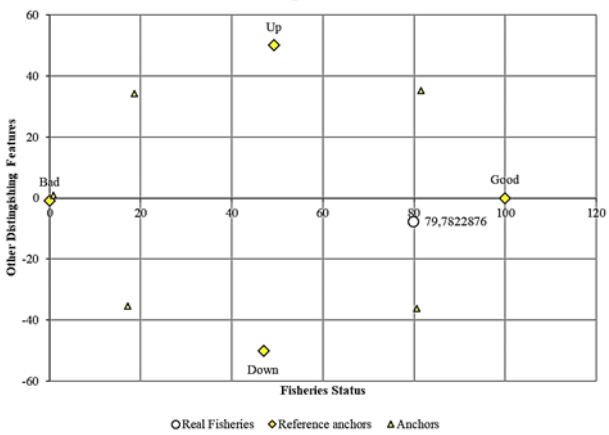

Figure 4. Sustainability Status Index of Regulatory and Institutional Dimensions

Regulatory and Institutional Dimension

The index of the ordination results for the sustainability status of the implementation of waste banks in The Raafi Elementary School in Bandung on the dimension of Regulations and Institutions, as a whole is 79.78% or in the category is very good because the value of the Regulatory and Institutional dimension index falls into the range of 75.01-100.00 (very sustainable).

Based on monitoring in the field, regulations and legislation related to the management of waste banks both at the national, provincial, and city/ district levels are complete, including guidelines in the management of school-based waste banks In addition, the institution of waste bank management has been formed and active, namely The Raafi Elementary School Waste Bank in Bandung. These conditions encourage this regulatory and institutional dimension to be very sustainable in the future. Sustainability status of the regulatory and institutional dimensions of Raafi Elementary School Waste Bank in Bandung is presented in Figure 4.

Leverage Attributes

Based on the analysis, it can be known that sensitive attributes in the dimensions that measure the sustainability status of the implementation of waste banks in The Raafi Elementary School Waste Bank in Bandung City can be seen in Tabel 3.

Table 3. Leverage Analysis on Sustainability Status for Ecological Dimension

No.	Attribute	Value
1	Landuse	13.64
2	Location to school	9.418
3	Accessibility	11.34
4	Location to waste sources	19.87

Table 4. Leverage Analysis on Sustainability Status for Economical Dimension

No.	Attribute	Value
1	Diversification	5.85
2	Economical advantage for community	8.18
3	Profit generation	8.24
4	Support from private	5.82
5	Support from government	5.93
6	Operation budget support	6.62
7	Investment support	7.03

Table 5. Leverage Analysis on Sustainability Status for Social Dimension

No.	Attribute	Value
1	Teacher & student perception	0.028
2	Transaction continuation	0.132
3	Teacher & student knowledge on waste management & waste bank	0.032
4	Frequency of knowledge enforcement	0.007
5	Percentage of community involvement	0.032
6	Waste bank system participation	0.132
7	Involvement of teacher and student in waste bank development	0.017

Table 6. Leverage Analysis on Sustainability Status for Regulation and Policy Dimension

No.	Attribute	Value
1	Standard of Operation and Procedure	5.87
2	Institution of waste bank	7.66
3	Regulation stability	20.22
4	Legal documentation from head of school	3.84

- Ecological Dimensions contain attributes of the waste banks location close to the source of waste (RMS = 19.87) and land use rates around waste banks (RMS = 13.64) as leverage to support the sustainability of the implementation of waste banks. The dimensions of the Ecological aspect have an MDS index value of 80.02. The location of school-based waste banks only has a potential source of waste from the school environment, which is limited in the type and amount of the incidence, so that the waste saved is relatively small. In addition, the level of land use around the waste bank is mostly used for teaching and learning activities so that the room used by the waste bank is relatively small. Nevertheless, the application of waste banks that are part of the 3R principle has economic benefit value and has an effect on the behavior of learners in managing waste so that it will be able to reduce the volume of waste dumped into the final waste processing site.
- The economic dimension has the attributes of the benefits of waste bank management (RMS=8.24), community/ student economic benefits (RMS=8.18), government investment cost support (RMS=7.03), private/NGO investment cost support (RMS=6.62), O&P cost support from the government (RMS=5.93), waste bank has other diversification (RMS=5.85), and O&P fee support from private/NGO (RMS=5.82) as leverage supports sustainability of waste bank implementation. The MDS index value is 26.95. Income from waste bank management is generally unreliable for the routine operation and maintenance of waste banks. School-based waste banks generally self-finance the management of their waste banks, relying only on transactions that occur between garbage banks and customers with inadequate quantities. Based on these conditions, investment and O&P cost support, both from the government and private / NGOs is needed by school-based waste bank managers. Government support can be through school sanitation programs while from private parties / NGOs through CSR programs.
- The Social Dimension has the attributes of customer continuity in saving (RMS = 0.132), and the participation of all elements of school society (teachers and students) in building a waste management system (RMS = 0.132) as leverage to support the sustainability of the implementation of waste banks and has an MDS index value of 49.88. Continuity of customers saving consistently and the participation of all elements of the school community in building a waste management system tends to be low, greatly

affecting the sustainability of the implementation of waste banks. Based on these conditions, the increase in the capacity of teachers and students in community-based waste management using the waste bank approach needs to be done programmatically and continuously.

- The Regulatory and Institutional dimensions contain the attributes of legal stability that regulates (local regulations and mayoral regulations in waste management) (RMS = 20.22), as leverage supporting the sustainability of the implementation of waste banks. The Regulatory and Institutional aspect dimension has an MDS index value of 79.78. Regulations and legislation that become protections in the application of waste banks in Indonesia are quite complete, both on a national, provincial and district/city scale, but many have not been implemented in the field.

Conclusion

Sensitive attributes affect the application of waste banks in Raafi Elementary School there are 12 attributes, namely from dimensions: (a) Ecology (location of waste banks close to the source of waste and land use rates around garbage banks); (b) The economy (benefits from waste bank management, community/students benefiting economically, investment cost support from the government, investment cost support from private/NGO, O&P cost support from the government, waste banks have other diversification, and O&P cost support from private/NGO); (c) Social (continuity of customers in saving, and participation of all elements of school society (teachers and students) in building waste management systems), (d) Regulations and Institutions (legal stability governing, local regulations and mayoral regulations in waste management).

Recommendation

The research conducted only reached the stage of assessment of sustainability index and determination of sustainability status, therefore it is necessary to conduct further research that is policy analysis that needs to be done to improve the sustainability of waste banks in schools. The approaches that can be used are Participatory Prospective Analysis and System Dynamics Model.

Acknowledgement

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REDESIGN LIVING PHARMACY PARK, KALI ANYAR VILLAGE, TAMBORA SUBDISTRICT, WEST JAKARTA

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Abstract

Living Pharmacy Park in Sub village (SV) 007, Sub-sub village (SSV) 04, Kali Anyar Village, Tambora District located in West Jakarta is the location of Community Service activities. This activity was carried out gradually starting from before the Indonesian government issued a new order rule (New Normal) until the government issued new normal rules due to the Covid-19 pandemic. With the New Normal rules provide changes to the design of a living pharmacy park that has been designed before. This article aims to express the changes that occurred in the design of the living pharmacy park. The methods carried out are participatory methods and qualitative methods that are described descriptively. This article discusses the changing design sections that are adapted to the distance keeping rules. Redesign living pharmacy park is a work that combines design with the rules of New Normal covid 19.

Keywords: *Living pharmacy park, New normal, Redesign*

Introduction

Community service (CS) activities in the academic year 2020/2021 at Sub village (SV) 007, Sub-sub village (SSV) 04, Kali Anyar Village, Tambora District in West Jakarta is a series of multi-CS activities that began in the academic year 2019/2020. CS is currently carried out in 2 (two) stages, namely the design of the living pharmacy park and building a living pharmacy park. This article describes aspects of the redesign of the living pharmacy park carried out in CS.

Design is a word that consists of re and design. According to the Great Dictionary of Indonesian, redesign means a redesign. Another understanding conveys that design is an activity to change renewal so that it can meet positive goals for progress (Yusuf, R. D., Mutalib, W. A. 2021). Based on this understanding, the redesign in architecture is a redesign that is done because of changes that occur in the architecture. Related to this CS, the redesign carried out is to redesign the design of the living pharmacy park from the design image that has been produced in CS activities in 2019/2020. This change occurred due to something that affected the design.

In the previous CS activity produced an image of the design of a living pharmacy park that presents architectural elements in the form of stairs, arrangement of open space area barriers with regional roads, arrangement of chairs, sinks and water tanks, and where to lay plants. But recently with the Covid-19 pandemic in Indonesia, the government issued a new order rule (New Normal) for people to be able to carry out daily activities in the Covid-19 pandemic. The new order rules are to use masks, wash hands, and keep a distance (Kurniati, et al. 2021). With this new rule, the previous design image underwent changes in the design of the

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living pharmacy park. The change made is to apply the new order rules to the design of the living pharmacy park.

Research Methodology

The activity of redesigning the living pharmacy park is carried out using participatory methods. Participatory method is a method that involves the participation of parties related to the activities carried out (Aprianto, K.T. 2019 and Ardiansyah, M. 2016). Based on the understanding of participatory methods, in redesigning the living pharmacy park at SSV 04/SV 007, Kali Anyar Village, Tambora District in West Jakarta involves the surrounding community. The role of the community in CS activities so that the community has a sense of responsibility for the results of the draft that has been mutually agreed upon.

After being decided together with the aspects that affect the design image of the living pharmacy park, the next step is to describe the forms of changes made. To describe it is used qualitative methods that are described descriptively. The product of the design of the living pharmacy park is an architectural image. This depiction is done using computer software technology applications namely Autocad and Sketchup.

Figure 1. Kali Anyar Residents Map

This CS activity is on land owned by Kalianyar Residents who are on Kali Anyar X Road, 8th street, SSV 04/RW.007, Kali Anyar Village, Tambora District, West Jakarta City, Jakarta Capital Special Region, post code: 11310.

Figure 2. Front-looking Tread

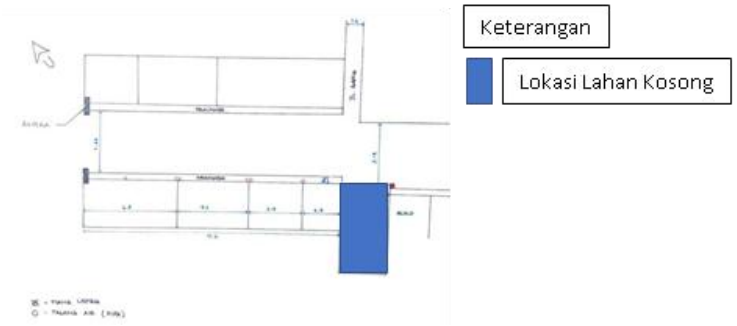

Figure 3. Location of vacant land in SSV 04/RW007

Result and Discussion

According to Shashi Caan (2011) in producing meaningful designs it is necessary to pay attention to the overall aspects that exist around humans. This not only pays attention to the physical aspects of humans but also pays attention to the experience and quality that surrounds it. Of course, these things are related to human relationship with their environment. Based on that, one form of the human environment that is currently happening in the world is a change in human lifestyle due to the Covid-19 pandemic announced by WHO (World Health Organization) on March 11st, 2020. For

Ivan (2020), changes in human lifestyles present due to the Covid-19 pandemic show that these changes have a psychological and behavioral change in society.

Changes in lifestyle that occur due to the pandemic are known in the community as New Normal (new order rules). The rules that must be carried out by the community are to use masks, wash hands, and keep a distance. The appeal from the government that keep the distance between one person and another person is 1 meter. Related to maintaining this distance, in the design of architecture related to human space expressed by Edward T. Hall as proxemics. The space is divided into intimate space (45 cm), personal space (45 cm-1.2 m), social space (1.2 m-3.6 m), and public space (3.6 m-7.6 meters) (Caan, S. 2011). Based on this understanding, the appeal delivered by the government to the community falls into the category of personal space of each individual community.

Application of New Normal

Based on the understanding related to the new order rules applied to reduce the spread of Covid-19, the design of a living pharmacy park also applies the New Normal rules. Therefore the design of the living pharmacy park are undergoes changes. New Normal regulations that affect the design of live pharmacy parks are hand washing and keeping a distance (social distancing).

Based on the results of field surveys in Tambora Residents and the application of New Normal to the results of design that have been made, there needs to be changes and design adjustments. These aspects will affect the use of green open areas and also affect user comfort. Here are some design readjustments to CS activities at SSV 04/SV 007 Kali Anyar Village, Tambora District, West Jakarta.

Figure 4. Old Layout

Figure 5. New Layout

Portable Sink Location

In the initial design has been planned the portable sink to be used as a place to wash hands as well as watering plants in the green open area. This portable sink is placed in the front area of the tread where when the user enters the green open area will pass through the portable sink zone. The location in the front area is not changed because it has responded to the New Normal rules where when entering the living pharmacy park, the residents easily access the area for hand washing that is close to the entrance area to the park.

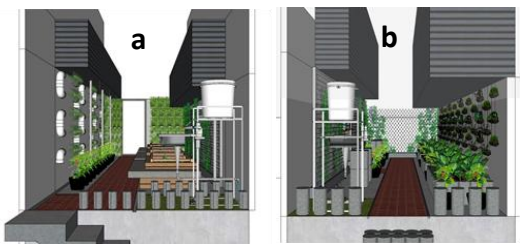

Figure 6. (a) Before **(b)** After the Location of Portable Sink

Portable Sink Orientation

Related to the new rules that apply the sink to wash hands, the design of the living pharmacy park from the beginning of the design has designed an area for hand washing. But there are differences that can be seen in the initial layout and the new layout, namely the location and direction of the roof of the hand washing facility. It looks like in figure 7.

Figure 7. (a) Initial, **(b)** New Portable Sink Orientation

At the beginning of planning, the portable sink orientation leads to the west which means the room for the sink user stands on the west direction of the sink. This situation is difficult because the width of the site is only 2.5 meters which includes circulation that comes from the circulation of stairs and the circulation of users to the inner room, so that if the sink remains oriented to the west, when there are residents who are using the sink, other residents who just entered could not pass through it because circulation was blocked by residents who were using the sink. To anticipate these situation, the orientation of the portable sink is planned to go southwards to reduce the build-up of circulation at one point. The accumulation of circulation at one point does not support the new normal rule because it does not pay attention to the distance keeping rules applied to the design.

Moving Seated Area on Site

The area built for the Tambora Green Open Space area is only 15 m^2, which in the initial design was formed the division of zones into two, namely circulation areas and plants areas. With the use of the plants areas made built in with the user's sitting and relaxing area. Made by making innovations in the shape of plant pots measuring 90 cm×195 cm and then there are plates on 3 sides of the pot approximately 30 cm that can be used as a seat. Because the tread room is quite narrow, the circulation path must still be made in accordance with the minimum standard of manufacture because for the convenience of the occupants, so that what can be done is to create an alternative design that can be multifunctional in one area.

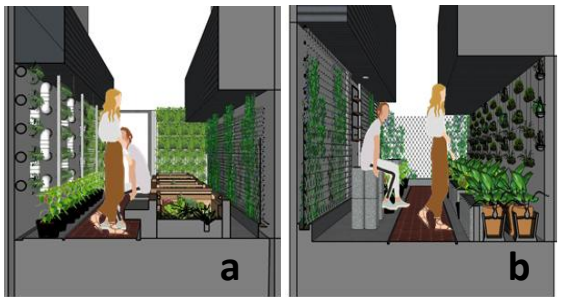

Figure 8. (a) Initial Layout, **(b)** New Layout of Seating and Watering zones

But the divide of zones as described above does not support the New Normal rules, so it needs to be changed. Made a seating design made of cylindrical concrete 15 cm in diameter with a height of 30 cm arranged 4 pieces to form a square. With the shape of such a chair will minimize the room for residents to sit. The zones is divided into 3 zones, namely right, center and left. The right zone as the plant area, the left for the plant and the sitting area, and the circulation path is in the middle. Continuous circulation path to the end of the tread.

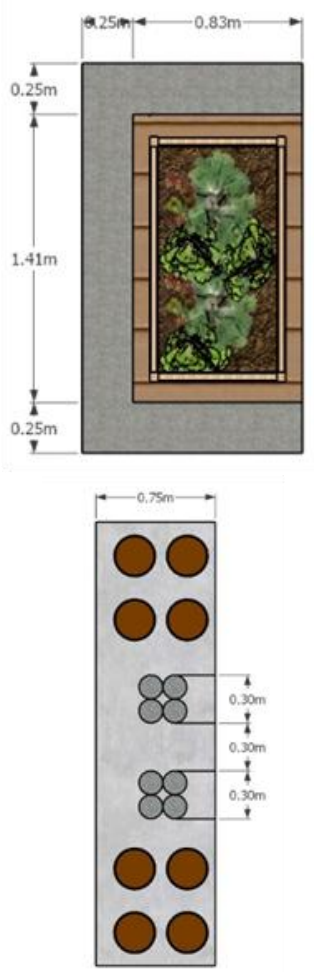

Figure 9. Initial Sitting Area Dimension

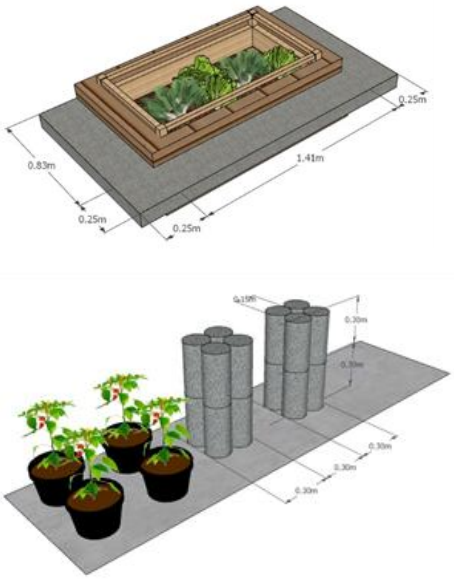

Figure 10. New Sitting Area Dimension

Site Border Area for Security

The security system in a resident becomes one aspect that needs to be considered to avoid things that are not desirable. In Tambora resident every neighborhood is connected by a road in the form of an alley. And the location of the site designed for Green Open Space on the border. So that initially designed by not giving a bulkhead at the end of the site that intersects with the next neighborhood to facilitate circulation between residents. However, the location around Tambora is quite secluded and must avoid open space is used improperly, so a barrier is needed to secure the area. The system used to provide bulkheads uses wire material. The selection of materials using wire serves as a barrier between areas but does not limit the visibility of humans or users as well so that the impression of green open space will remain wide.

Figure 11. Initial Dividing Wall Material

Figure 12. New Dividing Wall Material

Conclusion

Based on the design process and the design results of Living Pharmacy Park in the SSV 04/SV 007 Tambora, West Jakarta can be concluded that the redesign process applied there are several things that have their own reasons, among others:

1. The position of the portable sink was originally on the right of the entrance area but the position inhibited the flow of circulation of space users and was not in accordance with the New Normal rules so that the position was changed to be on the left.
2. The orientation of the portable sink need to change to produce a wider and efficient space for the sink user and meet the New Normal rules.
3. The transfer of the seating area that was originally into one with the flower pot area was made separately. So there is a division of its own area, namely the seating area and the flower pot area. The sitting area is moved to the left area by paying attention to the distance of the seat in response to the policy of keeping distance (social distancing).
4. The site area bordering Hamlet 3 should not be a closed wall so the design changes are made by barriers using wire and do not provide doors in the border area. This method is done to limit people who enter the living pharmacy park so that easily controlled by residents who enter the site to avoid things that are not desirable. It is also to implement the New Normal policy of keeping a distance.

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KNOWLEDGE SHARING OF OCCUPATIONAL HEALTH AND SAFETY IN MINING AT PT. PILAR ARTHA SEJAHTERA, LAMPUNG

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Abstract

Mining activities in general are high risk and high financing activities. One of the risks that are of concern to mining activities is related to occupational health and safety (OHS). The importance of OHS for the mining industry, the Community Service (CS) team of the Faculty of Earth and Energy Technology conducted counseling activities and discussions on the importance of the implementation of OHS in the field of mining. OHS counseling is done at Pillar Artha Sejahtera Company which is one of the small-scale mining industries that conduct andesite stone mining with a quarry system located in Lampung. Participants in this CS activity in addition to the team consisting of lecturers and employees and also followed by employees and leaders of PAS Company. CS activities are carried out by the method of exposure of material by the team which was previously preceded by field survey activities conducted by the CS team and furthermore is a discussion activity. Based on the discussions that developed during the activity, employees and leaders of PAS Company appreciates and is very grateful for the implementation of CS activities, because through this activity there is a refreshment of understanding and deepening of OHS material that has been an integral part of PAS Company. PAS Company hopes that activities like this should continue to be carried out, even not only for CS activities, it can also be for teaching and research activities.

Keywords: *Knowledge Sharing, Occupational Health and Safety, Pillar Artha Sejahtera Company*

Introduction

Occupational health and safety (OHS) is an important part of the mining industry (Atmaja & Palimbong, 2020). OHS aspects are included in the rules of good and correct mining (Ministry of Energy and Mineral Resources, 2018). PAS Company is one of the mining industries that will not be free from potential accidents and potential health problems, especially for employees in the field. Characterization of the potential that can arise due to mining activities even in a small scope of work must always be done, by doing so, preventive measures can be taken to avoid accidents. Understanding and refreshment of OHS must be done by following the rules and regulations that have been set by both the local government and the central government. In addition to following the existing rules, it is expected that there is also good cooperation with parties who can provide OHS refreshment for employees and company

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leaders. So that OHS activities are not only an obligation but have become part of the pulse of the mining industry (Prakoso et al., 2021).

This Community Service (CS) activity is carried out with the aim to provide refreshment of understanding and deepening of the importance of attention to occupational health and safety in the mining industry. With this activity, it can increase good cooperation between college institutions and the mining industry as a form of link and mach activities. Cooperation made not only through community service activities can also be improved by teaching activities such as field trips and also research activities to help the mining industry in solving problems faced in the field.

Research Methodology

CS activities are carried out at Pilar Artha Sejahtera Company (PAS Company) which is one of the mining companies that do andesite stone mining with quarry mining system. PAS Company is one of the mining companies that include the middle. PAS Company is located in Lampung Province. Established in 2016, PAS Company supporting in the process of building the trans Sumater toll road starting from Bakauheni to Palembang. Mining activities conducted in PAS Company ranging from mining activities to processing activities, namely the reduction of rock size in accordance with orders from consumers, as seen in Figure 1. The main products are Split Material 1-2 (size 1-2 cm), Split Material 2-3 (size 2-3 cm), screening material (size 0.5-1 cm), and stone ash material (size 0.1-0.5 cm).

Figure 1. Operational Activities in PAS Comp.

CS activities begin by conducting a survey to PAS Company to get an overview of the condition of mining operations directly in the field. This activity is also to see firsthand what potential affects occupational health and safety for employees. In addition to seeing directly, there are also interviews with several employees and company leaders. The delivery of field conditions was delivered by the deputy Head of Mining Engineering.

This form of CS activity is exposure to material by the team. The delivery of material is delivered through zoom media, because in the condition of the Covid-19 pandemic, so it cannot be done directly. The material submitted is a policy related to OHS mining, OHS management, the actual condition of the number of accidents in the mining field. Exposure is delivered in the form of interesting images in order to get the attention of the response from the participants. In addition to the form of images, it is also delivered in the form of graphics to increase the awareness of the participants, to maintain occupational health and safety in the place where employees perform activities. After exposure by the CS team, continued with discussion activities, so that participants get a thorough understanding of the importance of the implementation of OHS in the field of mining and can be applied in their respective workplaces.

Result and Discussion

Participants of CS activities are teams consisting of lecturers and Faculty of Earth and Energy Technology employees, employees and leaders of PAS Company with the number of participants as many as 16 people seen in Figure 2. The CS activities began with a preliminary speech delivered by the CS Team Leader, who conveyed the purpose of this Community Service activity. The purpose of CS is to provide an overview to employees at PAS Company on the importance of paying attention to occupational health and safety in the field of mining. One thing that needs to be realized is that if you do not pay attention to OHS activities and there is an accident, then the sanctions can be up to the closure of mining operations. Next is to get a welcome from the Head of Mining Engineering PAS Company, conveyed that CS activity is highly appreciated, because with this activity, it can provide refreshment to leaders and employees who are constantly reminded about the importance of OHS in the field of mining.

Figure 2. Community Service Participants

In Figure 3, the head of PAS Company presented the material as an introduction to PAS Company to the CS team. The exposure delivered is history, mining operations, activities of suing or reducing the size to the marketing process. Head of PAS Company also reminded the importance of good mining practice rules in mining activities whose contents are: (1) Licensing and legality of mining companies, (2) Exploration systems, (3) Mining feasibility studies, (4) Conducting mining activities, (5) Good and planned processing of mining materials, (6) OHS aspects, (7) Environmental aspects, (8) Human rights aspects or rights of the surrounding community, and (9) Aspects of mine closure or post-mine continuity. Based on the Good Mining Practice, it is emphasized how to conduct mining operations that always pay attention to aspects of OHS.

The presentation delivered by the CS Team consists of 3 materials namely OHS Manage-ment in the Mining Industry, Occupational

Health and Safety Practices in the Mining Industry, and the last is material on the application of 5S (*Seiri, Seiton, Seiso, Seiketsu and Shitsuke*) and *Hourensou* as seen in Figure 3. At the OHS Management meteri in the mining industry delivered several explanations about occupational health and safety, mining safety and mining occupational health and safety. Occupational health and safety are conditions and factors that impact, or can have an impact on, the health and safety of employees or other workers (including contract workers & contractor personnel, or others at work) (OHS Management Systems, 2007). Mining safety is all activities including the management of safety and health of mining work and the safety of mining operations, then the meaning of safety and health of mining work is all activities to ensure and protect workers to be safe and healthy through efforts to manage work safety, occupational health, work environment and occupational safety and health management system (Directorate General of MINERBA, 2019).

It is also conveyed that the purpose of work safety is to prevent/take precautions so that workers/employees do not get injured/harm and also there is no damage or loss of equipment /materials or production. While the factors that need to be mined in work safety are: humans, machines, materials, working methods, and the work environment. Strengthening awareness that OHS activities are something regulated by the government, it is also conveyed the legal basis of OHS.

Figure 3. Explanation of Material by CS Team

There are legal bases used related to good mining rules. Law No. 3 of 2020 on Amendments to Law No. 4 of 2009 on mineral and coal mining, the relevant regulations are the Decree of the Minister of Energy and Mineral Resources No. 1827K/30/MEM/2018, Decree of the Minister of Energy and Mineral Resources No. 26 of 2018 on the implementation of good

mining rules and supervision of mineral and coal mining, and Decree of the Director General of Minerals and Coal No. 185/30/DJB/2019 on instructions for mining safety implementation techniques and implementation, assessment and reporting of Mineral and coal Mining Safety Management System.

An understanding of the work safety measures that employees need to take is very important to know. This activity provided an overview of the steps in occupational safety, including: (1) Knowing the work to be done, (2) Understanding the steps/stages of the work, (3) Knowing the dangers that may occur from the work to be done, and (4) Knowing how to control the dangers. In addition, it is also explained about the benefits obtained if you can do good work safety, including: (1) Saving the family from: sadness/diffculties, an uncertain future, and loss of income/livelihood. (2) Saving employees from: Pain/disability, Loss of time, Sadness, Loss of the future, and Loss of income/livelihood and (3) Saves the company from: Loss of labor, expenses due to accidents, training or replacing injured employees, loss of time due to delayed activities and decreased production, may even stop production.

In mining operations, the importance of employees having good health in carrying out their activities in the company. So the team explained the purpose of occupational health is to protect workers from everything that can harm health due to work. It is also important to have health checks for employees. A health check is carried out on: (i) the new worker, to determine the overall initial condition of the new employee; (ii) Long-time workers, in order to monitor health/diseases that may arise as a result of the work performed; and (iii) Health checks are periodically conducted every: at least once every 6 months for underground mine employees and at least once a year for mine employees on the surface. Sources that affect the work environment generally come from dust, noise, lighting, vibrations and toxic gases.

OHS's succeed in mining can occur by continuing to do OHS coaching for employees. Efforts that can be done to achieve OHS well, through: (1) counseling, Lectures on OHS, Installation of OHS posters and Screening of films/slides about OHS; (2) safety talk, conducted at each shift, discussing what is done, what risks, what equipment should be used, and hazard handling; (3) Safety training, training on how to use work safety equipment; (4) Safety Inspection: Unplanned inspection and planned inspection (general and periodic observation /inspection); (5) Safety Investigation, Safety Meeting, Environmental Monitoring of Working Conditions, OHS Organization; (6) Provision of OHS Equipment; and (7) Annual OHS Programs, including: OHS Observation Training Program, Job Safety Analysis (JSA) Program, Planned OHS Inspection, Joint Inspection, and Meetings.

On exposure to OHS practices in mining activities, some accident data has been submitted in mining activities. Based on mining accident data released by the directorate general of minerals and coal in 2021 as seen in Figure 4 (Directorate of Engineering and Environment Directorate General of Mineral and Coal, 2020). Mine accident data submitted from 2015 to 2020 with the category of light, heavy and dead. Based on the data, it is seen that the highest light accident data occurred in 2017 with the number of accidents at 62 incidents, the lowest in 2020 with the number of 33 incidents, while in 2015, 2016, 2018 and 2019 were 52, 59, 47 and 49. Accidents with the highest heavy category in 2019 amounted to 105 incidents and the lowest occurred in 52 incidents. In 2015, 2016, 2017 and 2020, there were 78, 71, 94 and 95 incidents. While the accidents that caused the

highest death occurred in 2015 as many as 25 incidents and the lowest occurred in 2018 and 2017, which was 11 accidents, for 2016, 2018, 2019 and 2020 were 16, 17, 24 and 17 incidents.

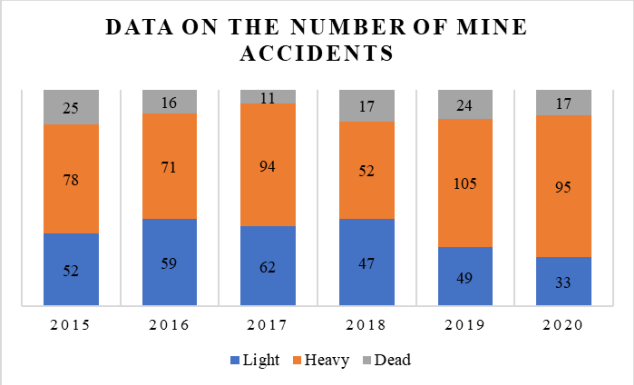

Figure 4. Data on the Number of Mine Accidents

Figure 5 shows the exposure delivered by the Directorate General of Minerals and Coal, which conveyed data on the number of deaths due to mining activities in 2019. The data that died was categorized based on commodities, types of permits and work experience. Based on the type of commodity, the number of percentages died in the largest mining activities occurred in mineral commodities at 62%, while in coal commodities as much as 38%. Based on the type of permit, the most in the contracting company is 79%, then occurs in the owner's company as much as 17% and for sub contractor service companies as much as 4%. Based on work experience divided into 3 criteria, namely 0 to 3 years as much as 5%, 3 to 5 years as much as 30% and those over 5 years as much as 13%.

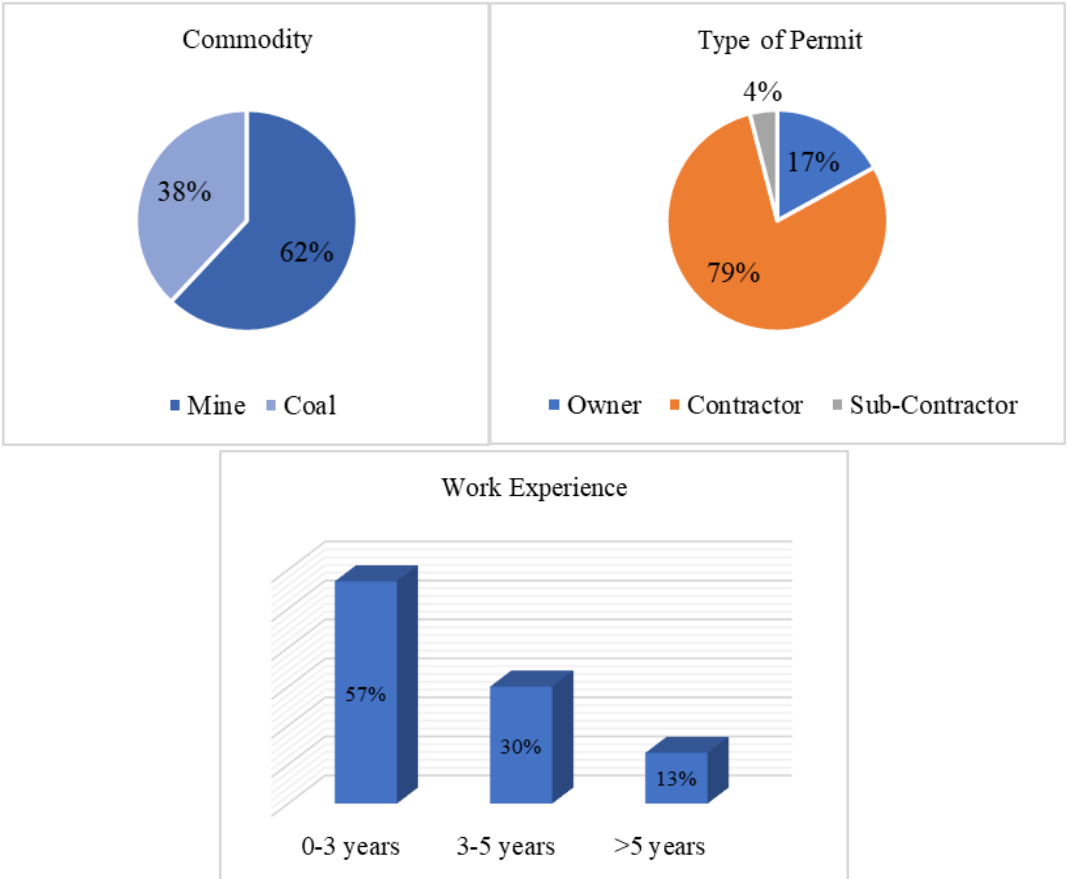

Figure 5. Distribution of Accident Data Died in 2019

The last material delivered was the application of 5S (*Seiri, Seiton, Seiso, Seiketsu and Shitsuke*) and *Hourensou*. This material is delivered because it is considered important for companies with the hope that through the implementation of 5S and 1H this can improve performance in the company by doing timely work with maximum results. In Indonesian 5S is known as 5R, namely *Ringkas, Rapi, Resik, Rawat dan Rajin.* While Hourensou is interpreted as *Hou* for *houkoku* which means report; *Ren* for *renraku* which means inform; and *Sou* for *soudan* which means consultation. In addition to providing theories of 5S and 1H, there are also examples of application applications in several places such as companies engaged in recycling (Nur, 2016), transportation companies (Sugiharto et al., 2019) and even mining companies (Prawira et al., 2018).

The discussion activity was the last activity carried out at this CS activity session. The discussion went very effectively and there was enthusiasm shown by the participants. Participants generally ask related to awakening OHS culture in themselves. Conveyed to the participants that the main effort is to start from a small environment first, starting from home and then being used as a culture. In addition, it must also start from ourselves, if everyone has cultivated OHS, then health and safety for us is maintained and also for other co-workers, thus ensuring mining operations.

Conclusion

Based on the exposure that has been submitted above, it can be concluded some of the following:

1. Community Service activities for industries that are aligned with their areas of competence are felt to be very useful, because it can provide refreshment for employees and companies in the field.
2. All employees in PAS Company is a participant of this CS activity and follows and conducts very intensive and interactive discussions.
3. Cooperation between industry and university must continue to be improved, not only through CS activities, it can also be done with other activities, such as field visits and practices for students and joint research.
4. Leaders and employees are very grateful for this CS activity, because with this activity, there is a refresher about the importance of OHS for employees and company leaders.

Acknowledgment

With the implementation of CS activities in PAS Company, the team expressed its gratitude to Trisakti University for financing this activity, to the Department of Mining Engineering and the Faculty of Earth and Energy Technology for the support that has been given and to PAS Company has given the CS team the opportunity to do this activity and there is a flexibility to discuss and share experiences.

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FEASIBILITY STUDY OF JALUPANG WASTE DISPOSAL SITE OF SUBANG REGENCY

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Abstract

The increasing number of residents in Subang Regency every year has a direct impact on the amount of waste generation that must be managed. Until now, Subang Regency only has the Panembong Waste Disposal Site (WDS) in Parung Village which is intended to serve the entire Subang Regency area which includes 30 sub-districts. The Panembong WDS has started operating Since 1991, with the current Open Dumping operational system, the Panembong WDS has experienced an overload on an active land area of ± 2.2 Ha. The total area of the Panembong WDS is ± 6.5 Ha which is used ± 1.6 Ha for general landfill infrastructure, the Active Zone of ± 2.2 Ha is used as a landfill area and the Passive Zone ± 2.7 With such conditions, the Subang Regency government proposes and plans to transfer and move the location of the Final Waste Disposal Site (WDS) at the planned location, while the planning location for this WDS is at: Jalupang Village, Kalijati District. The new WDS is planned to use the Sanitary Landfill system, considering that the Open Dumping system is no longer allowed by the government since 2009 which is based on Law No. 18 of 2008 concerning Waste Management. The initial step in the construction of the Sanitary Landfill WDS system is determining the location of the WDS which must comply with the requirements and provisions regarding environmental management, public order, city/environment cleanliness, regional regulations on waste management and urban spatial planning, as well as other implementing regulations that have been determined. by the government. To be able to determine the location of the landfill that meets these requirements. The provisions that must be met to determine the location of the landfill are as follows (SNI number 03-3241-1994).

Keywords: *Jalupang WDS, Sanitary Landfill, Subang Regency, Waste Disposal Site*

Introduction

The waste problem is one of the urban problems that has been experienced in Indonesia. This problem is inseparable from the lack of balance between the amount of waste generated and the available waste management infrastructure and facilities. Where the amount of waste generated every year continues to increase in proportion to the increase in population, while the growth of infrastructure and facilities is stagnant (slow). Generally, cities in Indonesia have a waste management system with inappropriate handling methods, namely the collect-transport-dispose method. Waste is always identified with waste or worthless waste. Along with higher population growth and a shift in people's lifestyles that are more consumptive, will result in an increasing quantity of waste volume that must be handled. Organic waste (food waste and yard waste) is expected to have been processed

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at the source level or on a communal scale, as well as sorting inorganic waste that can still be recycled (paper waste, plastic waste, metal waste, and glass waste). Final Processing Site (WDS) of waste that uses a landfilling process is a waste processing infrastructure, which is expected to be the final processing of waste in the form of residue only (textile waste, rubber waste, and other waste).

Due to the inadequate handling of waste, it has an impact on the aesthetics of the city which causes the city to look dirty and slum. In addition, this waste also causes water pollution, air pollution (rotten smell) and results in many vectors and germs. In big cities, it is not uncommon for this waste to cause flooding as a result of the blockage of drainage channels and rivers by garbage. As a result of all that, in the end this waste problem has an impact on aspects of public health, socio-economic and socio-cultural.

Waste in Subang Regency consists of residential waste, market waste, shopping waste, public facilities waste, educational waste and street sweeping waste. Until now, waste is managed using the Open Dumping method, where waste is only disposed of without being covered with soil or without further processing. This if left unchecked, it will cause disturbance to the environment. These disturbances include, among others, a place for various disease factors to develop, causing odors and dirt and polluting the surrounding water. Therefore, this method does not meet WDS requirements, so a temporary WDS change must be made, namely Open Dumping to a better WDS, namely the Sanitary Landfill method, so that the processing process will be better controlled.

Research Methodology

This research methodology uses observational research methods by conducting field and institutional surveys. The data required in the form of primary data and secondary data. Primary data were obtained through direct surveys to the field, while secondary data were obtained from government agencies and literature studies. The data is processed and analyzed by scoring, buffering and overlaying methods with the help of a Geographic Information System (GIS). Determination of the location of the landfill refers to the Indonesian National Standard (SNI) number 03-3241-1994 regarding the procedure for selecting the location of the waste landfill.

The selection of a landfill site must have the following provisions:

1. Landfills must not be located in lakes, rivers, and seas.
2. Determination of the location of the WDS is arranged based on 3 stages, namely:
    - Regional stage which is the stage to produce a map containing the area or place in the area which is divided into several feasibility zones.
    - Elimination stage which is the stage to produce one or two best locations among several selected locations from the feasibility zones in the regional stage.
    - Determination stage which is the stage of determining the selected location by the authorized agency.
3. If an area cannot meet the regional stage, the selection of a waste landfill location is determined based on the waste landfill site selection scheme.

Regional Criteria

Regional Criteria are the criteria used to determine the appropriate or unfeasible zones as follows:

1. Geological Condition
    - Not located in the Holocene fault zone (active fault)
    - Must not be in the Geological Hazard Zone

2. Hydrogeological conditions
   - Should not have a groundwater level of less than 3 meters
   - Ground clearance should not be greater than 10^{-6} cm/sec.
   - The distance to the source of drinking water must be greater than 100 meters downstream of the flow.
   - In the event that there are no zones that meet the criteria mentioned above, then technology input must be held.
3. Zone Slope must be less than 20%.
4. The distance from the airfield must be greater than 3000 meters for turbojet flights must be greater than 1500 meters for other types.
5. Not allowed in protected areas / nature reserves and flooded areas with a return period of 25 years.

Elimination Criteria

The Eligibility Criteria are the criteria used to select the best location, which consists of regional criteria plus the following criteria:

1. Climate
   - Rain intensity the less rain the better.
   - Wind, the dominant wind direction is not towards settlements is considered to be getting better.
2. Utilities: more complete available is better rated.
3. Biological Environment:
   - Habitat: less variety is considered better.
   - The carrying capacity of supporting the life of flora and fauna is considered to be getting better.
4. Soil Condition
   - Soil productivity: unproductive is rated higher.
   - Capacity and age: can accommodate more land and longer is considered better.
   - Availability of land cover: having sufficient ground cover is considered better.
   - Land status: more varied is considered not good.
5. Demographics: lower population density is considered better.
6. Administrative limits: within administrative limits, it is considered better
7. Noise: the more buffer zones the better.
8. Smell: The more Buffer Zones in the rating the better
9. Aesthetics: The less visible from the outside, the better.
10. Economy: The lower the unit cost of waste management (per m^3/ton) the better.

Determination Criteria

Determination Criteria are the criteria used by the authorized agency to approve and determine the selected location in accordance with the policies of the local authorized agency and the applicable provisions.

Result and Discussion

From the preliminary description above that for the determination of the location of this new WDS must be in accordance with the applicable terms and conditions, as for the alternative locations proposed to be the Final Disposal Site in Subang Regency, namely in Jalupang Village, Kalijati District and Cipeundeuy Village, Cipeundeuy District. Previously, Subang Regency had built a Final Disposal Site (WDS), namely Panembong WDS located in Parung Village, Subang District with the following coordinate points:

- Latitude : 6°35'32.17"S
- Longitude : 107°44'18.48"E

Figure 1. WDS Panembong Location

While the scope of the work of the feasibility study is currently planning for the new WDS which is planned to be located in Cipeundeuy Village, Cipeundeuy District, Subang Regency and Jalupang Village, Kalijati District, as for the image of the location of the planned activity through satellite image maps (google Earth) can be seen in Figure 2 below.

The coordinates for the new WDS plan are: Jalupang Village, Kalijati District.

- Latitude : 6°32'49"S
- Longitude : 107°35'19"E

Figure 2. New WDS Location Plan

The area of the WDS planning area in Jalupang Village, Kalijati District for the first stage is ± 14.8 Ha. For the land status of the location of this WDS development plan, until now the Subang Regency Government has carried out ongoing coordination with the plantation party, in this case PTPN as the authorized agency. in plantation land management. This is because the land that will be used in planning the construction of this WDS facility is on PTPN land.

Figure 3. WDS Location in Jalupang Village in Area of Former Sugarcane Plantation

The MOU agreement (Land) from both parties is the basic basis for whether or not the new WDS development planning in Subang Regency is successful, it is hoped that the Subang Regency Government can continue to coordinate and communicate with related parties regarding this land issue. So it is hoped that in the future land problems can be clean and clear and the WDS planning process at the Jalupang Village location can be continued to the next process such as: Environmental Impact Analysisvand other related Environmental Permits (acquisition/land acquisition/land), and others .

After the land, environmental permits, and environmental documents are fulfilled, the planning is included in the Landfill Building Planning along with DED (Design Engineering Details), and finally the implementation of the

realization of the WDS development in Jalupang Village, Kalijati District, Subang Regency.

The land identification process for the overall WDS development planning (facilities and infrastructure) starting from the road access facilities to the WDS location, other WDS supporting facilities, and up to the WDS development itself, is required to be identified from the pre-planning stage. This is aimed at the next identification process, whether the planning and realization activities will have a direct impact on the land owned by the surrounding community or commonly referred to as Project Affected Persons (PAPs). if the activity has a direct impact on the PAPs, then the local government is obliged to replace the ownership assets of land, buildings, and other assets directly affected by the project activities to be carried out, following applicable laws and regulations. (Regulation of the President No. 62 of 2018 concerning Handling of Social Impacts on Society in the Context of Providing Land for National Development, and other legislation. The following is an analysis to see the strengths or potentials and weaknesses or weaknesses that exist in Jalupang Village, Kalijati District, Subang Regency:

Table 1. Analysis of Landfill Location Determination Criteria

Criteria for Determining the WDS Location Based on SNI Number 03-3241-1994	**Jalupang Village, Kalijati District**
A. Location Plan	
➢ Lake	The location is not close to the lake
➢ Sea	The location is not close to the sea
➢ River	The location is not close to the river
B. Regional Criteria	
➢ Geology Condition	
The location is not in the Holocene fault	The site is not in the Holocene fault
Geology danger zone	The location is not in the danger zone
➢ Hydrology Condition	
Distance from river > 100 m	Distance to the river ≤ 100 m
Zone slope < 20%	< 20% (0°-17°)
Distance to the airport > 3000 m	The location is close to the airport
Potential of groundwater levels	Excluding industrial areas
Protected areas/nature reserves	Excluding protected areas/ nature reserves, the location is on a former sugarcane plantation
C. Preliminary Criteria	
➢ Rain intensity (the smaller the better)	362-487 mm/month
➢ Utility	Road access to the location is not good (pavement)
➢ Soil condition	
Land productivity	The land is not productive anymore
Availability of covered land	Buffering zones are available, as the land is in the plantation area
Land status	Under the management of Indonesian State Forestry Company (PTPN)

Criteria for Determining the WDS Location Based on SNI Number 03-3241-1994	Jalupang Village, Kalijati District
➢ Demography	
Distance to settlement	The location is far from the settlement (± 3 km)
➢ Noise	
Buffer zone	Buffering zones are available, as the land is in the plantation area
➢ Smell	
Buffer zone	Buffering zones are available, as the land is in the plantation area
➢ Aesthetic	
Not visible from the outside	Not visible from the outside, but tends to be close to provincial road access and settlements.
D. Assignment Criteria	
➢ Neighborhood	• Includes areas of military development, trade, urban, plantations, livestock, agricultural people's forests, housing, and urban areas. • Excluding water catchment areas • Development of industrial zones
➢ Socialization	Socialization has been done to the people.
➢ Local government policy	Coordination with relevant agencies regarding the determination of the location of the new landfill plan

Table 2. New Landfill Location Parameter Assessment Results

No	Parameter	Weight	Value	W×V
I	**GENERAL**			
1	*Administrative Limits*	5		
	a. Within administrative limits		10	50
	b. Beyond administrative limits but in one integrated waste landfill management system		5	
	c. Beyond administrative limits and beyond integrated landfill management		1	
	d. Beyond administrative limits		1	
2	*Ownership of land rights*	3		
	a. Central local government		10	
	b. Personal		7	
	c. Private/corporate rights and/or ownership status		5	
	d. More than 1 owner of rights and/or ownership status		3	9
	e. Social/religious organizations		1	
3	*Land Capacity*	5		
	a. More than 10 years		10	50
	b. 5-10 years		8	

No	Parameter	Weight	Value	W×V
	c. 3-5 years		5	
	d. Less than 3 years		1	
4	*Number of landowners*	3		
	a. 1 Family		10	
	b. 2-3 families		8	
	c. 4-5 families		5	
	d. 6-10 families		3	
	e. More than families		1	
5	*Communinty Participation*	3		
	a. Spontaneously		10	
	b. Driven by		5	15
	c. Negotiations		1	
II	**PHYSICAL ENVIRONMENT**			
1	*Soil (above groundwater)*	5		
	a. Permeability < 10^{-9} cm/sec		10	0
	b. Permeability 10^{-9} cm/sec		7	
	c. Permeability > 10^{-6} cm/sec unless there is a technological input			
2	*Groundwater*	5		
	a. ≥ 10 m with permeability < 10^{-6} cm/sec		10	0
	b. > 10 m with permeability < 10^{-6} cm/sec		8	
	c. ≤ 10 m with permeability < 10^{-6} cm/sec – 10^{-4} cm/sec		3	
	d. > 10 m with permeability < 10^{-6} cm/sec – 10^{-4} cm/sec		1	
3	*Groundwater flow system*	3		
	a. Discharge area/local		10	
	b. Recharge area and discharge area local		5	15
	c. Recharge area regional and local		1	
4	*Related to the use of groundwater*	3		
	a. Possible utilization of groundwater with hydrolysis limits		10	0
	b. Projected to be utilized with hydrolyse limits		5	
	c. Projected to be utilized indefinitely hydrolysis		1	
5	*Danger of flooding*	2		
	a. There is no danger of flooding		10	20
	b. Possibility of flooding > 25 years		5	
	c. Possibility of flooding < 25 years unless there is a technological input		1	
6	*Land cover*	4		
	a. Cover land is enough		10	40
	b. Cover land is enough until half-time usage		5	
	c. There is no land cover		1	
7	*Rain intensity*	3		
	a. Under 500 mm per year		10	
	b. Between 500 mm-1000 mm per year		5	15

No	Parameter	Weight	Value	W×V
	c. Above 1000 mm per year		1	
8	*Road to location*	5		
	a. Flat in good condition		10	50
	b. Flat in bad condition		5	
	c. Not flat		1	
9	*Waste transport*	5		
	a. Under 15 minutes from waste centroid		10	
	b. Between 16-30 minutes from waste centroid		8	40
	c. Between 31-60 minutes from waste centroid		5	
	d. More than 60 minutes from waste centroid		1	
10	*Entrance road*	4		
	a. Waste trucks don't go through settlements		10	
	b. Waste trucks through medium-density settlements (≤ 300 pp/Ha)		5	20
	c. Waste trucks through medium-density settlements (> 300 pp/Ha)		1	
11	*Traffic*	3		
	a. Located 500 m from public roads		10	30
	b. Located < 500 m from low traffic		8	
	c. Located < 500 m from medium traffic		5	
	d. Located on high traffic		1	
12	*Land use*	5		
	a. Has little impact on the use of surrounding soil		10	
	b. Has medium impact on the use of surrounding soil		5	
	c. Has high impact on the use of surrounding soil		1	5
13	*Farm*	3		
	a. Located on unproductive land		10	
	b. There is no impact on the surrounding agriculture.		5	
	c. Has a major impact on the use of surrounding soil		1	3
14	*Protected areas/nature reserves*	2		
	a. There are no protected areas/nature reserves around it		10	2
	b. There are protected areas/nature reserves around it that are not negatively affected		1	
	c. There are protected areas/nature reserves around it that are negatively affected		1	
15	*Biological*	3		
	a. Low habitat value		10	30
	b. High habitat value		5	
	c. Critical habitat		1	
16	*Noise and Smell*	2		
	a. There is a buffer zone		10	20
	b. There is a limited buffer zone		5	
	c. There is no buffer zone		1	
17	*Aesthetic*	3		

No	Parameter	Weight	Value	W×V
	a. Protection operations are not visible outside		10	30
	b. The protection operation looks a little from the outside.		5	
	c. Protective operations visible from the outside		1	
	Total			447

With a total of 447 points, for parameter assessment and physical location planning in Jalupang Village, Kalijati District, it can be said that it is feasible to be used as a new WDS location planning in Subang Regency.

Subang Regency Geophysical Conditions

- Geology

  The study of the geological conditions of Subang Regency is based on data from the results of previous investigations by the geological research and development center (PPPG) of the Geological Directorate of the Department of Mining and Energy in 1978. The geology of the northern coast of Subang Regency is formed by four sediment units, namely:

  - Deposits of tuffaceous sandstone, sandstone, sand and tuffaceous silt. Forming a broad plain of weak waves, moderate to high graduation, especially in sandstone weathering found in the Ciasem, Batanggede and surrounding areas.
  - River Sediment Alluvium, generally composed of fine-grained materials (silt clay with sand inserts) and coarse-grained materials (sand and gravel), low to high graduations are found in the eastern part of the Pusakanagara area.
  - Alluvium of medium to fine grained plain deposits consisting of sand and clay with sandy inserts, medium graduation, most of the northern coastal area of Subang Regency is formed by alluvium of this plain deposit.
  - Silt, sand, gravel covered with clay were found in the northern part of Pangarengan village.

As for Geology, the soil type in Jalupang Village, Kalijati District, is mostly composed of rock types:

- Yellowish-red podsolik, and
- Latosol - andosol.

The soil bearing capacity in the planning location of the WDS Jalupang Village, Jalupang District as a whole is red soil with a podzolic type (yellowish red soil type). The characteristics of this soil type are soils that are formed due to high rainfall and very low temperatures and are also old mineral soil types that have a yellowish or reddish color. The color of this podzolic soil indicates a relatively low level of soil fertility due to leaching. The yellow and red colors are caused by oxidized lumps of iron and aluminum. The clay minerals found in this soil are dominated by silicates. Soil types are Latosol and Andosol in most of the Kalijati District, generally the type of soil is latosol. The characteristics of latosol or inceptisol soil are as follows:

- Has a rather thick to thick soil solum, which is from about 130 cm to more than 5 meters.
- The soil is red, brown, to yellowish
- Soil texture in general is clay

- The soil structure in general is crumb with a loose consistency
- Has a pH of 4.5 to 6.5, i.e. from acidic to slightly acidic
- It has about 3% to 9% organic matter, but in general it is only 5%
- Contains moderate to high nutrients. Nutrients contained in the soil can be seen from the color. The redder the color of the soil, the less nutrients it contains.
- Has a rather fast to rather slow infiltration
- The power of the homeland is quite good

Technically in terms of soil type, the WDS location planning in Jalupang Village, Kalijati District can meet technical feasibility.

- Geomorphology

Judging from the topography, Subang Regency can be divided into 3 (three) regional zones, namely;

1) Mountain Area

   This area has an altitude between 500 - 1500 m above sea level with an area of 41,035.09 hectares or 20% of the entire area of Subang Regency. This area includes Sagalaherang District, most of Jalancagak District, most of Cisalak District and most of Tanjungsiang District.

2) Wavy/Hilly Area

   Areas with an altitude between 50 - 500 m above sea level with an area of 71,502.16 hectares or 34.85% of the total area of Subang Regency.

3) Lowland Area

   With a height between 0-50 m above sea level with an area of 92,639.7 hectares or 45.15% of the entire area of Subang Regency. This is the north coast region (North Coast) covering the Districts of Pagaden, Cipunagara, Compreng, Ciasem, Pusakanagara, Pamanukan, Legonkulon, Blanakan, Patokbeusi, a small part of Cikaum District and a small part of Purwadadi District. When viewed from the level of land slope, it is noted that 80.80% of Subang Regency has a slope of 0°-17°, 10.64% with a slope of 18°-45°, while the rest (8.56%) has a slope above 450.

The area includes Cijambe District, Subang District, Cibogo, Kaljati, Cipeundeuy, Most Purwadadi and Cikaum Districts.

Conclusion

The regional stage is the initial stage in determining the location of the WDS, which is intended to reduce the observation area in the study area. At this stage, two zones are obtained, namely the feasible zone and the unfeasible zone. The determination of the regional suitability zone is carried out by overlaying the physical parameters which are the basis for the requirements for determining the location of the landfill. The physical parameters are the slope, lithology, and the potential of the groundwater table and meet the limiting factors.

Judging from the description above regarding the analysis of determining the location of the new WDS planning in Subang Regency, from these points it can be concluded that for a good and proper planning location it is in Jalupang Village, Kalijati District.

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DEVELOPMENT OF FISH FARMING IN BUCKETS SYSTEM AND INNOVATION OF PROCESSED PRODUCTS TO IMPROVE COMMUNITY RESILIENCE IN THE FACE OF THE COVID-19 PANDEMIC

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Abstract

The Covid-19 pandemic has an impact in all fields, namely in terms of health, social, economic, and food. Reduced income or even job loss to cause a decrease in the ability to meet basic needs, namely family food needs. Corporate Social Responsibility (CSR) of Pertamina Corporation Integrated Terminal Jakarta initiated collaboration between community groups and various stakeholders through the integration of *the budikdamber system and the development of processed product innovations* done in Rawa Badak Selatan Village, Koja District, North Jakarta as the Area 1 Company's Ring. The development of processed innovation products is carried out together with the Bunda Koja group by carrying out all contain catfish product (ACE) activities. ACE's *budikdamber* activities are empowered by cultivating fish and vegetables in buckets carried out in several yards of residents of the Rawa Badak Selatan Village. This activity is expected to contribute to the community's resilience in the face of pandemics by increasing knowledge and skills in developing mental systems and their processed products. The implementation of activities is carried out by training methods and the application of mentoring. The community generally feels helped because the process of making processed and ACE *budikdamber* is empowered to facilitate for the community to get nutritious food. This activity also has an impact on improving nutrition and socioeconomics of toddler parents, through training in nutritious catfish processed products, toddler mothers can learn to understand the importance of nutritious food for toddlers.

Keywords: *Budikdamber, Nutritious food, Pandemic*

Introduction

Coronavirus disease 2019 (Covid-19) by SARSCoV-2 virus (Severe Acute Respiratory Syndrome Coronavirus-2) is a new disease that have to watch out for due to relatively rapid transmission, having a mortality rate that cannot be ignored. The World Health Organization (WHO) on January 30, 2020 has designated the Covid-19 pandemic as a public health emergency of international concern (Susilo et al., 2020). Data from the Ministry of Health said that on August 12, 2021, the accumulation of the total number of positive Covid-19 in Indonesia reached 3,774,155 people, with patients dying by 113,664 people (Ministry og Health, 2021).

The Covid-19 pandemic has an impact in all fields, not only in terms of health, the impact of the pandemic also affects the social, economic, and food sectors. The Food and Agricultural Organization (FAO) states that the Covid-19 pandemic affects food supply and demand, and

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indirectly through decreased purchasing power, capacity to produce, and distribute foodstuffs (Hirawan and Verselita, 2020). The Covid-19 pandemic also led to reduced income or even job losses. Reduced family income leads to a decrease in the ability to meet basic needs, namely family food needs (Suryana et al., 2020). Rawa Badak Selatan Village (KRBS) is one of the villages in Koja District, North Jakarta with the most populous population compared to other villages. Rawa Badak Selatan Village has an area of 1,0162 km^2 or 7.70% of the area of Koja District. The population of Rawa Badak Selatan Village in 2018 amounted to 51,889 people, while the overall population in Koja District was 334,876 people out of a total of 6 villages (BPS, 2020). Increasing the number of people can cause various problems including limited employment so that it will have an impact on the family economy, health problems and the number of unemployed that can cause rising poverty (Saribanon et al., 2020).

The technique of fish cultivation in buckets (*Budikdamber*) was first proposed by Juli Nursandi, lecturer from the Faculty of Aquaculture from Lampung State Polytechnic. This technique can be done by utilizing limited land (Nursandi, 2018). This method combines a hydroganic system with a fish farming pond underneath. Hydroganic system is a hydroponic farming system but is done organically pond water containing fish manure will be an additional source of nutrients for plants. Hydroponics technology provides an alternative in narrow areas to be able to produce food sources with environmentally friendly systems. The advantage of this system is that it can cultivate vegetables and fish, so that the fulfillment of family nutrition during the Covid-19 pandemic can be fulfilled properly (Suryanti et al., 2020).

Government policies are made to avoid Covid-19 transmission are carried out by reducing or limiting outdoor activities or Large-Scale Social Restrictions (PSBB). This policy affects the fulfillment of basic needs for the family. The government also imposed Work from Home (WFH) reminding the wider community to stay at home only and not leave the house if there are no activities or very urgent affairs (Besila et al., 2021). Corporate Social Responsibility (CSR) of Integrated Terminal Pertamina Corporation in Jakarta initiated collaboration between community groups and various stakeholders by integrating the budikdamber system and developing processed product innovations conducted in Rawa Badak Selatan Village, Koja District, North Jakarta as the Area 1 Company's Ring.

Budikdamber activities are carried out by cultivating catfish along with kale vegetables. The advantages of catfish are that they have high adaptability to environmental conditions and very fast growth (Zulisyanto, 2016). The development of processed innovation products and the Bunda Koja Group are carried out by carrying out all-catfish elements (ACE) activities. This activity is expected to contribute to the community's resilience in dealing with the Covid-19 pandemic by increasing knowledge and skills in developing the budikdamber system and its processed results in a sustainable manner to positively impact economic, social, and environmental aspects.

Research Methodology

Research Location

The implementation of the activities was done in Rawa Badak Selatan Village, Koja District, North Jakarta City. The event was held in May 2020-July 2021. The implementation of activities is done by training methods and the application of mentoring. *Budikdamber* activities were done in several houses of KRBS residents, training activities to make catfish processed innovation products were conducted at Hamlet number 01’s Hall.

Implementation Method

ACE's empowered activities are fish and vegetable cultivation activities in buckets (*budikdamber*) done in several yards on Rawa Badak Selatan Village. The CSR team provides the facilities and infrastructure of this activity. Preparation is done by preparing 10 units of *budikdamber* media as the initial stage of this activity, and continues to grow more gradually until it reaches 75 units. Monitoring and recording is done every week. Catfish harvest is done every three months, kale can be harvested every 20-30 days. Then the harvest can be directly processed by the surrounding residents, in addition, the Bunda Koja Group also develops the harvest into a variety of innovation products all-catfish elements (ACE).

All-catfish Product Innovation Development Implementation Methods

The development of processed innovation products is carried out together with Bunda Koja Group (BKG) by carrying all-round catfish (ACE) activities. This activity also involves mothers of toddlers by making various innovations in catfish processed products and the utilization of side products in the form of catfish bones, so that the processing process is carried out with zero waste. The program series includes catfish processed innovation training, catfish processed production management assistance, and product marketing assistance.

Catfish processed innovation training consists of exposure of materials about the nutritional content of catfish, handling of catfish raw materials, and the stages of catfish process. The raw materials of making products are prepared by several members of BKG and assisted by the CSR team. Catfish processed innovation products that have been made together with all participants, namely the group of mothers of toddlers, some toddlers and the health center of Koja District can then be directly consumed and carried by all participants. ACE production management assistance is carried out by CSR team with BKG. Mentoring activities are carried out by making Production Operational Standards so that product quality is always uniform, packaging process into distribution process. The team also help provide production house facilities and standardized tools.

Product marketing assistance is done gradually. Product sales are limited to the community around KRBS. After various products have been produced and obtained a Domestic Industrial Food permit from the Ministry of Health and Master Number, the distribution process is carried out on a larger scale. BKG together with CSR team will market products through social media and various marketplaces.

Data Collection and Analysis Methods

Data collection is done with observations and interviews. Qualitative data analysis with descriptive elaboration describes the stages of implementation. Sources of Information about the implementation of activities in this research include CSR Integrated Terminal Pertamina Corporation in Jakarta as an informant implementing the program, mother koja group, toddler mothers, and the community around Rawa Badak Selatan Village as the recipient of the program.

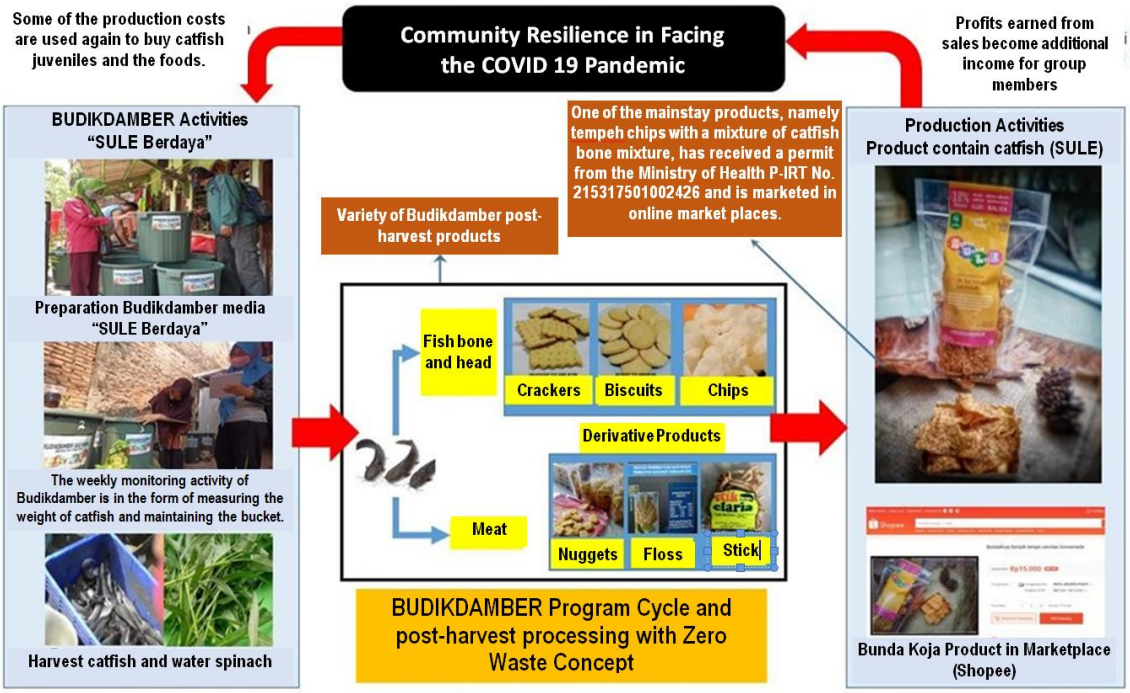

Figure 1. Integration of *Budikdamber* powered activities and ACE production

Result and Discussion

Budikdamer and All-Catfish Activities

The preparation of ACE activities is empowered by socializing and educating about the process of *budikdamber* biosystem, the advantages of *budikdamber* system that can be placed in narrow or limited areas, more efficient water use, additional planting of kale vegetables to meet vegetable needs, easy for people to do in the yard and able to meet nutritious food needs.

The next stage is to determine the place to be used to place the *budikdamber* media. The land area needed for one medium is 0.2 m^2, this medium is able to accommodate 50 catfish with a density of 1 head/L. The number of media as many as 10 units is expected to reach 50 kg assuming 1 bucket produces 5 kg of catfish in one period for 3 months. The top of the *budikdamber* can also be placed 10 pots of kale plant media, with a harvest period of 20-30 days. The initial stage after planning the preparation of the place and the media is to carry out the cultivation process and maintenance in accordance with the techniques carried out by Nursandi (2020). *Budikdamber* bucket unit that has been prepared, filled with water until it reaches a volume of 80 Liters, the top of the bucket is hung with plastic cups containing wood charcoal as a medium of planting kale. In order for kale plants to grow well, plastic cups are given small holes as a place of entry of water into the growing medium of kale. Catfish seeds used measuring 11-13 cm as much as 50 tails in one unit *budikdamber*. Catfish feed used is feed in the form of pellets whose size is adjusted to the size of catfish.

Budikdamber maintenance by the residents is done regularly with periodic water draining, feeding and weekly monitoring. Feeding is done three times a day, the amount of feed given will be adjusted to the size and weight of the catfish. Weekly monitoring is done to determine the growth of catfish by sampling measurements of weight, length, and width of catfish. Draining is also done periodically every two to three weeks.

Figure 2. ACE *Budikdamber* empowered in the yard of Rawa Badak Selatan resident

The process of harvesting kale is done every 20-30 days, by cutting the base, so there is no need to sow seeds, kale plants can grow from the base and can be harvested again. The process of harvesting catfish can be done after three months. The harvest of kale can be done up to three times for three months. The Bunda Koja group partly utilizes the harvest from this ACE empowered activity as raw material for all-round catfish innovation products. Crops are also marketed around the Koja District area. Estimated income in doing *budikdamber* as many as 10 buckets based on Saribanon (2020) is estimated to reach ± Rp. 3,000,000.00- for 3 months *budikdamber's* period.

The existence of this program becomes a hope for the community in the Rawa Badak Selatan Village. The community responds to this program positively because the community generally feels helped by the existence of this program. The process of making and maintaining it is not too difficult and is still relatively easy for the community to follow the maintenance process until the harvest process.

ACE Product Development Activities

This activity was held at Hamlet number 01's Hall, Rawa Badak Selatan Village, Koja District, North Jakarta City. The implementation of activities is done by training methods and the application of mentoring. The BKG of 10 people and mothers who have toddlers amounted to 5 people as subjects in each activity, accompanied by CSR Pertamina team, IPB academics, and Koja District health center. The training and mentoring system is carried out with direct practice, so that the BKG can actively understand the material provided.

Training activities involving IPB academics in the field of processing of aquatic products, processes and techniques for making various products are carried out in accordance with the guidelines of materials that have been prepared in advance. The material presented in each session is education about the nutritional content of catfish, its economic value, the importance of nutritional intake for toddlers, and various processed catfish products. The output of this activity is that mothers who have toddlers and BKG understand the importance of nutritional intake and how to make processed from nutritious catfish.

Catfish processed innovation training is divided into three meeting sessions. The first session was the making of nuggets and catfish flakes. The second session is the manufacture of catfish sticks, and the third session is the utilization of catfish bone side products into cracker products, fish bone tempeh chips, and biscuits. IPB academics guide each session training, the material is displayed with an LCD, so that all participants can listen well. The activity continued with the direct practice of making processed catfish with all participants. Products are made with larger protein components. Catfish nuggets are made with a composition of catfish meat as much as 60%, while the composition of meat in abon products as much as 64%.

Utilization of fish bones in the previous production process becomes an untapped byproduct even though there is a high calcium and phosphorus content. The bones and head of catfish have a calcium content 9.35% higher than catfish meat which is only 0.65%. In addition to calcium, catfish bones contain

phosphorus, magnesium, potassium, and sodium (Handayani and Kartikawati, 2015).

Figure 3. Nugget products given to toddlers in the area around Rawa Badak Selatan Village

The results of catfish processed innovation products that have been made can be directly tried by all participants. During the training activities, the enthusiasm of participants was quite good, through discussion sessions many questions were submitted related to the material, curiosity about catfish and processed fish and business opportunities. The group of koja mothers and toddler mothers can gain new knowledge about making nuggets and flakes. The results obtained from this activity include a variety of products made with a nutrient-dense composition and can be liked by many circles. Children and toddlers more taste nugget products. Abon products and tempeh chips are more tasted by mothers.

ACE Production Management

The BKG carries out the process of processed catfish by involving mothers of toddlers, starting with the preparation of Production Operational Standards and the preparation of good sanitary and hygiene standards. The process of catfish is very attentive to cold chain production so that every nugget product after completion of production then distribution is always frozen. Sanitation and hygiene are done by always washing hands with soap before and after production activities and using masks and gloves to prevent contamination. Equipment and production sites are always in a clean state after and before production.

Flakes products, nuggets, and fish bone tempeh chips have gone through the production stage. The process of producing nuggets begins by mixing catfish meat with egg yolks, fine garlic, salt, and sugar using a blender then the mixture is added carrots, tapioca and stirred until even. The nugget dough is then steamed for 30 minutes. The batter that has been cooked is cut to the desired size, smeared with tapioca flour and then smeared with egg whites then bread flour. And then, it can be directly fried or stored in the freezer. The process of making catfish flakes begins by sautéing a fine seasoning, then lemongrass, galangal, bay leaves, orange leaves, brown sugar and coconut milk. Catfish meat that has been steamed and sifted then put into the seasoning mixture then continue to be cooked until dry browned, after ripe and not hot, then directly packaged in plastic.

The implementation of production activities is also accompanied by financial management assistance so that the BKG and mothers of toddlers are able to plan the business of processed meat and catfish bones in a sustainable manner. Assistance in the process of calculating the cost of production in catfish processed products includes the calculation of consumable costs, necessary equipment costs, depreciation costs of tools adjusted to production capacity. The Pertamina CSR team provides assistance for packaging and equipment needed during the production process.

The process of producing flakes, nuggets, and fish bone tempeh chips is done once a week. Some products will be given to several toddlers around the Village as additional food every month. Assistance is also carried out until the issuance of the Attempted Master Number permit. Fish bone tempeh chips have also been obtained household industrial food from the Ministry of Health.

ACE Products Marketing

Product marketing assistance is done gradually, initial sales are limited to the community around the Village. Products of processed catfish creations BKG introduced off-line with the distribution of products to various stalls, outlets or stores. They also conducted hearings with various agencies such as the exit party, the Food and Drug Supervisory Agency (BPOM), and the Mayor of North Jakarta to be able to introduce a variety of ACE products and positive impacts for toddler parents and the surrounding environment.

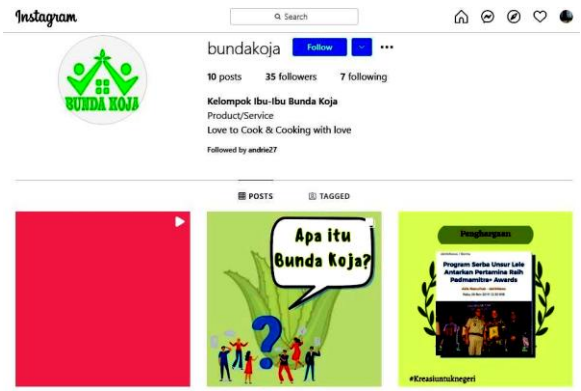

Figure 4. Bunda Koja Group on Social Media

Bunda Koja group, together with Pertamina CSR team has also been marketing products online through Instagram social media and the largest marketplace, Shopee. Instagram was chosen as one of the social media platforms that have supporting features for effective and efficient business continuity. Support features and the number of instagram users who jumped 40% during the Covid-19 pandemic, the development of accounts on instagram social media has a great opportunity to achieve the goals to be determined (Gunarso et al., 2021) Products that began to be produced by the BKG provide profit results of around Rp 500,000 every month. After the production house facilities assisted by Pertamina CSR team has been completed, the production process can be more, the profit of production is also five times greater to reach Rp 2,500,000 every month.

This activity has an impact on improving nutrition and socioeconomics of toddler parents, through training in nutritious catfish processed products, toddler mothers can learn to understand the importance of nutritious food for toddlers and processed innovations from catfish that have business opportunities. Processed fish products that were successfully made by toddler mothers are a small part of it brought to be distributed to toddlers as rice companion food, so it indirectly has an impact on improving toddler parenting. In addition, as much as 10% gained from profits on each production will also be given for the improvement of toddler nutrition.

Conclusion

This activity contributes to the resilience of the community in the face of pandemics by increasing knowledge and skills in developing the mental system and its processed products in a sustainable manner. Rawa Badak Selatan people generally feel helped by the existence of ACE's empowered program and innovation products. The process of making all-catfish products and maintenance of ACE *budikdamber* is empowered with assistance to make it easier for the community to get nutritious food. The community can directly harvest the results of *budikdamber*, so that it can meet the needs of vegetables and also protein from catfish. This activity has an impact on improving nutrition and socioeconomics of toddler parents, through training in nutritious catfish processed products, toddler mothers can learn to understand the importance of nutritious food for toddlers and processed innovations from catfish that have business opportunities.

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