



Waste Management Strategy in Rural Areas Based on Circular Economy in Jatidukuh Village, Mojokerto Regency

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Abstract. Jatidukuh Village is a village that has potential in agriculture, plantations and small-scale animal husbandry. From the data obtained through a site survey, the problem of Jatidukuh village is about the environment around the village where there is still a lot of garbage thrown out of place, especially in the area around the downstream river. The causes of these problems include the lack of knowledge and understanding as well as skills from residents in protecting the environment to process the waste, other factors are still the lack of waste processing facilities and the lack of participation of residents to participate in managing some of the existing potential. From these village problems, the solution to solving the problems needed by the village is by providing socialization and training of residents in protecting the environment to managing waste, building Waste Management Site (TPS) infrastructure, building and re-operating the Waste Bank system and Maggot Cultivation (black fly larvae) as an implementation of organic waste treatment and promoting the concept of circular economy through the 5R Reduce principle, Reuse, Recycle, Recovery, Repair. This article aims to describe waste management strategies as an effort to solve environmental problems, especially in waste, changing people's mindset that waste can be useful through an economic approach. Increase community participation to play a role in integrated management between waste that has been sorted by the community, waste banks and TPS3R. Design and form citizen groups as program managers.

Keywords: community participation, waste management site, waste bank

1. Introduction

Population growth in Indonesia is increasing and has an impact on the amount of consumption of its people, which also influences the increase in the amount of waste and residue from these consumptive activities. The main problem regarding rubbish and waste is the community's inability to manage waste independently [1]. Garbage means all kinds of solid waste resulting from human or animal activities which are thrown away because they are considered useless or no longer desired [2]. This definition of waste also has the same meaning as in Law Number 18 of 2008 which explains the meaning of waste, namely waste from daily human activities or natural processes in solid [3]. Meanwhile, the meaning of waste management is an activity that can reduce the amount of waste accumulated, recycle or reuse waste for other uses, and reprocess waste to make new products [4].

The latest SIPSN data as of 2023 shows that the amount of national waste generated is 33,647,601.72 tons/year, the amount of national waste that has not been managed is 12,061,805.14 tons/year and the amount of managed waste is 21,585,796.58 tons/year. These waste management performance achievements come from various programs and policies implemented by the government, private sector and community organizations. For example, the Waste Bank, Composting/RK/POO, TPS3R/PDU/ITF, Renewable Energy Sources, and TPA/TPST programs.

Mojokerto Regency has a total area of 969,360 Km² or around 2.09% of the area of East Java Province. Mojokerto Regency consists of 18 sub-districts and 299 villages. Jatidukuh is a village in Gondang District, Mojokerto Regency, East Java Province with a population of 3,101 people with varying levels of education from elementary school to tertiary education. The health level of the Jatidukuh Village community is quite good because it is supported by adequate facilities and infrastructure and Public awareness is quite high about the meaning of health. Based on statistical data, the population of Jatidukuh Village consists of 3,102 people with a male population of 1,576 people and a female population of 1,526 people. With a population of 3,102 people. With an education level of 1390 elementary schools, 215 high schools, 469 junior high schools, 26 universities, 25 school dropouts and 425 others. The level of education above affects the thinking patterns and livelihoods of the residents of Jatidukuh village, where the majority of the population's livelihood is as farmers.

In the area around Jatidukuh Village, there is quite a lot of rubbish that is not disposed of properly or is not managed by residents. One of the reasons is that there are no facilities or institutions that focus on handling this matter. Not only that, the level of knowledge and awareness of village residents is considered to be still lacking regarding waste management. Residents of Jatidukuh village tend to burn them, throw them into the river and even quite a lot of them beside the road or in their backyards. In reality, waste cannot decompose by itself, even though the nature of the waste is organic, it still requires proper processing so that the waste decomposition process can be faster. Bearing in mind that the accumulation of waste will continue to occur because every day people produce both inorganic and household waste. Based on the results of the survey, several residents often threw livestock

waste into rivers and backyards. Building awareness of Jatidukuh Village residents regarding the importance of protecting the environment and the importance of sustainable organic and inorganic waste processing systems as well as changing the community's mindset by instilling an understanding that waste can be useful through an economic approach.

Based on survey results on the economic scope or income, the residents of Jatidukuh Village are on average farmers and gardeners. On average, mothers belong to the lower middle economic group. Most of these mothers are just housewives who still produce little in their daily activities. Holding outreach and training to process waste into useful products is a useful solution for housewives. For example, these products are crafts or goods from used goods and organic fertilizer from organic waste which can later be used in their respective gardens or can also be bought and sold through Village-Owned Enterprises (BUMDES) or through intermediary community organizations such as Karang Taruna, PKK and Posyandu.

Similar to villages in general, Jatidukuh Village also has community organizations, such as Karang Taruna, PKK and posyandu. The role of community organizations is of course as a forum for providing various inspirations and innovations to develop villages. However, in Jatidukuh Village, several mass organizations such as youth organizations are considered to be lacking in developing villages with useful activities, especially in terms of protecting the environment. The potential for the results of this waste processing will later become a useful activity for several mass organizations and generate income for the village. Residents are not only taught how to process waste to turn it into economic value, but residents are also taught how to market the products themselves by following technological developments. Seeing that the waste problem is increasingly urgent, there are many ways to use this waste management. One of them is through waste management activities to create a circular economy [5].

2. Method

This circular economy has a vision to change the way humans view used plastic packaging, not as waste, but as a commodity that has the potential to be developed. The method is that used plastic packaging material maintains its value by being used repeatedly. This is in accordance with the objectives of the Sustainable Development Goals (SDGs).

This circular economy is one of the concepts in arranging the stages of program activities. The method used in implementing this community service activity is participatory community empowerment with a participatory rural appraisal model. Through an approach to the empowerment process and increasing community participation in all programs implemented [6].

The PRA method used in this waste management program has several stages, namely:

1. Identify the Problem
2. Needs Analysis

3. Program preparation and management
4. Infrastructure Development
5. Training and Counseling
6. Program Implementation
7. Monitoring Evaluation

3. Result & Discuss

3.1. Preparing a Waste Management Program

This activity is part of the P2MD which was initiated by the Director General of Higher Education since 2022. This program is implemented by a number of vocational universities throughout Indonesia. In this article, P2MD takes place in the Jatidukuh area, Mojokerto and is implemented by HIMASTAN (Vocational Applied State Administration Student Association), Surabaya State University. This activity took place in Jatidukuh, Mojokerto. Focusing on 2 hamlets, namely Seketi hamlet and Dukuh hamlet, for Seketi hamlet there are 4 RT here focusing on waste banks and for Dukuh hamlet there are 8 RT focusing on Black Soldier Fly Cultivation. Jatidukuh Village has a BUMDES, namely BUMDES Tirtamulia. But it has not been built/does not have a business that will be included in BUMDES. As a result, BUMDES in Jatidukuh still has no activities. If Black Soldier Fly Cultivation wants to be managed by BUMDES, then we have to reactivate BUMDES. For example, in Ketapannrame Village there is also Black Soldier Fly Cultivation. In an effort to reactivate BUMDES Jatidukuh, the Village Community Empowerment will also help with future progress. Apart from that, this activity can also be supported by the activation of Karang Taruna, which in fact consists of young people who are more technologically literate. Basically, this activity is based on the process of establishing a waste bank and cultivating Black Soldier Fly based on the idea of a circular economy. There are 3 (three) major programs in waste management carried out, namely waste banks, Black Soldier Fly Cultivation, and training on waste banks and Black Soldier Fly Cultivation.

3.2. Program Implementation Procedures

The procedures for implementing community empowerment through the Waste Bank program are as follows:

1. In the first stage, namely a survey to find out what the condition of the village environment is, the potential the village has and to see village problems that require innovation. The survey stage was also carried out by visiting the field and coordinating with village officials and community organizations. The data sought at the survey stage includes geographical location, environmental conditions, residents' habits, village potential, village problems, and village statistical data profile. The problem found is that there is no institution or administrator for a waste management system.

2. Determining the location for the construction of the Waste Bank and Waste Management Site (TPS) by looking at land area indicators and ease of access for residents. The location is not prone to flooding and is close to residential areas. The locations were determined to be Seketi hamlet for the Waste Bank, and Dukuh hamlet for Black Soldier Fly Cultivation as a decomposer for organic waste.
3. The coordination stage is related to permits to establish or renovate abandoned waste banks, TPS and training locations. In coordination, we will invite all residents to participate in the running of the program, collaborating with stakeholders such as the Mojokerto Village Community Empowerment Service to support the program by helping to disseminate education regarding environmental cleanliness and waste processing. WEHASTA as a Non-Governmental Organization (NGO) which operates in the environmental sector assisted the community empowerment team in compiling technical field procedures.
4. At the stage of socialization that is carried out well, there are 2 stages, namely: formal (village meetings) and non-formal (participating in community activities such as group prayer, having coffee together or weekly social gatherings and gymnastics). Socialization with the main topic Reduce, Reuse, Recycle.
5. Planning and preparing the need for tools, materials and supporting needs by conducting price and quality surveys of goods used for construction, located around Mojokerto Regency.
6. The process of building the TPS or Black Soldier Fly Waste and Cultivation Bank after planning the location, tools, materials and design which have been determined by inviting Jatidukuh Village residents to participate in the construction. Construction took almost 3 weeks.
7. Determine or select waste bank administrators and Black Soldier Fly Cultivation. This determination involves residents as voters based on the results of community deliberations. The Waste Bank management consists of 4 members, namely the chairman, secretary, sorting officer and packaging officer. Meanwhile, the management of Black Soldier Fly Cultivation consists of 2 members.
8. Outreach and training programs for village residents on the topics of sorting waste independently, waste bank procedures and Black Soldier Fly Cultivation. Training is carried out directly which explains the technical implementation of the program.
9. Promote collaboration between stakeholders. One of them is the Pentahelix collaboration which prioritizes three principles, namely reduce, reuse, recycle as provisions for developing a circular economy in waste management.
10. Monitoring and evaluation is carried out to see the extent of the success of the program that has been running with residents as the main driver.

3.3. Technical Implementation Of Waste Banks And Black Soldier Fly Cultivation

There are technical implementation procedures for the Waste Bank as follows:

1. sorting household waste
2. depositing waste to the waste bank
3. sorting
4. weighing
5. recording
6. transportation

The stages of Black Soldier Fly Cultivation include outreach to residents about collecting organic waste/kitchen waste for Black Soldier Fly, making cultivation buildings, training for administrators, implementing Black Soldier Fly Cultivation in several stages, namely:

1. nursery
2. feeding
3. harvest
4. marketing

Creating innovative facilities and infrastructure that Jatidukuh Village residents need to protect the environment, waste processing and utilization as a sustainable economy, innovation in developing a waste management system by building Black Soldier Fly Cultivation as a decomposer for organic waste/kitchen waste that has been thrown away or leftover food. Innovations in Black Soldier Fly Cultivation technology can help create sustainable solutions for various organic waste problems, including food security, organic waste management and animal feed sources. Then running a waste bank system to process inorganic waste, technology and innovation in the waste bank system to manage inorganic waste aims to increase efficiency in waste processing and recycling to encourage public awareness of the importance of good waste management.

Other innovations include the formation of new institutions such as the waste bank management team and Black Soldier Fly Cultivation. Other strategies for utilizing it for a sustainable economy include carrying out technical training on waste banks, Black Soldier Fly Cultivation, and marketing training. Increasing the role of community organizations to participate in developing villages by reactivating youth organizations which had been in a vacuum and there was no regeneration by holding hearings with the Village Community Empowerment Service and the Social Service to develop Youth Organizations.

4. Conclusion

Based on the activities carried out by P2MD Jatidukuh, Gondang District, Mojokerto, it can be interpreted that this activity brings benefits to local residents. Starting from environmental problems, residents learn to reinterpret the role of waste in daily life in an economic framework or generate employment opportunities and increase their income. We see that residents understand how to institutionalize a community that has a common problem in the form of a waste problem in a waste bank community called

Lestari. Apart from that, residents know how to manage black soldier fly seeds in order to support a circular economy.

There is a change in people's behavior or thought patterns and habits as is usually done, namely burning the rubbish and throwing it into the river. Now people are changing to understand the impact of throwing away rubbish, not on place, mindset to protect the environment and carry out waste processing to make the economy sustainable. The student team has a design for a program after P2MD, namely by forming a community group that understands and is responsible for waste processing and a sustainable economy from waste. Continuing to establish partnerships with several supporting parties is a component of the program's success.

Acknowledgment. We would like to thank those who supported and were involved in writing the article. Thank you to the Supervisory Lecturers and Jatidukuh village officials who gave us the opportunity to carry out research on the waste management system and the role of the community in supporting a waste management system. Thank you to the P2MD 2023 team for creating a waste management program. Thanks to this support we were able to compile this article

Disclosure of Interest. The authors have no competing interests to declare that are relevant to the content of this article

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