TPS-3R Program Strategy in Bandar Lampung City

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Abstract

Waste production in Bandar Lampung City reaches 4000 tons per day. Heaps of waste that do not decompose become problems such as plastic waste, food waste, and paper materials. The City Government of Bandar Lampung made Regional Regulation Number 05 of 2015 concerning Waste Management in the City of Bandar Lampung by implementing waste management through TPS 3R. The TPS 3R concept is a place for collecting, sorting, reusing, recycling, and processing regional scale activities. The area of TPS 3R, larger than 200 m², is equipped with a sorting room, organic waste composting, warehouse, buffer zone and does not interfere with aesthetics and traffic. This research leads to the development of waste processing facilities using a Cost Benefit Analysis approach with a plan for two scenarios, namely Scenario A (business-as-usual) and Scenario B (waste processing using TPS-3R). The pattern of waste management in Bandar Lampung City uses the direct collection method (door to door) and immediately accommodated in Bakung TPA A strategy to optimize waste management at 3R TPS through outreach to the public.

Keywords: Bandar Lampung; TPS 3R; Waste.


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INTRODUCTION

Waste problems are topics and issues that require special attention from all walks of life and will become a potential “waste emergency” disaster if there is no proper waste management. Kardono (2007) said that the problem of waste management in Indonesia is seen from several indicators, namely the high amount of waste produced, the level of public awareness and waste management services is still low, the limited number of final disposal sites, facilities and infrastructure for waste management institutions and cost problems.

Current public awareness to manage waste properly is still low. This is inseparable from our habit of assuming that all waste is useless and must be thrown away. Finally, what is formed is a mindset to recycle waste that is not controlled, hates garbage, is cultured to dispose of and eliminate waste from sight, not a culture to manage waste properly. Habits and culture that have been engraved in a person are indeed very difficult to change. Behavioral patterns perpetuate bad habits which are a common mistake and there is no other way but to improve behavior patterns and straighten out the habit of placing improper waste.

The habit of burning and burying waste that cannot be destroyed is a cultural culture that can cause damage to the environment and human health problems. Plastic is one of the materials that we can find in almost every item such as household waste, electronic waste, children’s toys and plastic waste to pesticides. Plastics used not in accordance with the requirements will cause various health problems, because they can trigger cancer and tissue damage in the human body (Gunadi et al, 2020).

Plastic waste can last for years, causing pollution to the environment. Plastic waste is not wise if it is burned because it will produce gas that will pollute the air and endanger human respiration, and if plastic waste is buried in the ground it will pollute the soil and groundwater. Plastic alone is consumed around 100 million tons/year worldwide. In general, plastics are difficult to be degraded (decompose) by micro-organisms. Various studies have linked Bisphenol-A (chemicals used in making plastic bottles) with low doses can have an impact on health, such as increasing prostate levels, decreasing testosterone hormone content, allowing breast cancer, prostate cells to be more sensitive to hormones and cancer, and making a person hyperactive (Diningsih and Aliyah, 2020).

One test proves that 95% of people have used goods containing Bisphenol A, therefore the use of very large amounts of plastic will certainly have a significant impact on human health and the environment because plastic is non-biodegradable. Plastic is estimated to take 100 to 500 years to decompose (decompose) completely. The use of plastic, both new plastic and plastic waste, must comply with applicable requirements so that it is not harmful to health and the environment. This is related to the strategy of implementing 3R TPS in an area (Karuniastuti, 2016).

Plastic waste greatly affects the marine biota ecosystem whose impact can return to humans themselves. Plastic waste can poison the smallest organisms such as plankton, by itself other large animals will be poisoned, and become very dangerous if re-consumed by humans. It is not surprising that we find fish polluted with pollutants around the world (Adiguna, 2019).

In 2006, Greenpeace stated that at least 267 different animal species had become entangled and died from plastic waste. Therefore, in every area that is prone to plastic waste, it must have a waste control and management system in order to reduce the harmful effects of plastic waste. Convery, McDonnell, & Ferreira, 2007). One of the most widely used waste control methods is waste control using the 3R
method (Reduce, Reuse, and Recycle). The application of the 3R system (Reduce, Reuse, and Recycle) is one solution in protecting the environment around us that is cheap and easy to do. The application of this 3R can also be done by everyone in daily activities. 3R consists of reuse, reduce, and recycle. Reuse means reusing waste that can still be used for the same function or other functions. Reduce means reducing everything that causes waste and recycle means reprocessing (recycling) waste into useful new goods or products (Hadiwiyoto, 1983).

The big city area in Lampung Province is Bandar Lampung City with a population of 1,166,066 people consisting of 20 (twenty) sub-districts which are divided into 126 (one hundred and twenty six) urban villages. The increasing number of residents in one city with high levels of urbanization and consumptive society affect the problem because the activities and businesses are increasingly complex, so there is also a large waste problem that must be handled. The initial problem that arises in the Bandar Lampung City Government is waste management (Joseph, 2007).

According to data from the Lampung Environmental Service in 2020, waste production is more than four thousand tons per day. The waste consists of plastic waste, food waste, and paper materials. According to Santoso and Enro, 2020 traditional market waste in Bandar Lampung City was recorded with The average total waste generation is 46,747 kg/day, the main composition of which is organic waste (84.48%). Besides that, there are also types of textile waste, leather, rubber, metal, glass, and so on.

The garbage was transported by the Sanitation and Parks Office of Bandar Lampung City from the Temporary Disposal Site (TPS) to the Bakung Final Disposal Site (TPA). The increase in the population of Bandar Lampung City has resulted in an increase in the level of public consumption and has an impact on increasing the amount of waste produced. The waste that enters the Bakung TPA belonging to the City of Bandar Lampung reaches 800 tons per day, with a composition of 60% inorganic waste, dominated by plastic waste and 40% organic waste. The limited area of the Bakung TPA, which is 14.2 hectares, which should be intended to accommodate 230 tons of waste per day, ends up with a pile of garbage that is getting bigger and bigger by the day.

Zafira & Damanhuri (2019) analysis of IFAS and EFAS, obtained the value of Strength posture is 0.421 and competitive posture is 0.063. The position of the value when positioned in the planning strategy quadrant is in quadrant 1. The recommended alternative strategies are development (aggressive strategy) or S-O strategy. The proposed strategy is the establishment of a special section in government in charge of enforcing regulations related to waste sorting from the source and fees, research and development of TPS 3R products through product diversification, and collaboration/collaboration with other parties, such as cooperation between 3R TPS, with the private sector, NGOs, or the agriculture and parks service. Recommendations for future waste management scenarios, namely optimizing 3R TPS built by minimum service coverage of 500 families. This is with the consideration that the chosen alternative in 2020 is able to reduce waste transported to landfill by +7300 tons/year, saving operational costs transportation of Rp. +3.5 billion/year, and reduced emissions by 1,268 MTCO2e/year compared to business as usual conditions.

Aziz, et al. (2019) states that the level of existing waste management services is only 9.13% of the total waste. The problems faced in waste management in West Pasaman Regency are the high generation of unserved waste, inadequate waste
management technical facilities and infrastructure, uneven waste management in the service area, and low waste minimization and utilization practices. In the future, the waste management system in West Pasaman Regency can apply a combination of waste management approaches at the city level based on 3R TPS based on Waste Processing Sites in residential areas and processing at the city level based on Waste Processing Sites. Integrated Waste Disposal Site (TPST) at the Final Processing Site (TPA), with planned system development in 15 years the volume of waste brought to the TPA can be reduced by 22.40%.

Malina, et al (2017) show that: (1) Waste Banks and TPS3R in Makassar City can improve the community’s economy and reduce unemployment, (2) Garbage Banks in Makassar City are acceptable to the community and do not cause negative impacts, (3) TPS3TR in Makassar City Makassar is in line with people’s expectations. perceptions around the location can make the air dirty due to environmental dust and smoke, (4) TPS3TR in Makassar City according to the perception of the community around the location can disrupt general traffic around TPS3R locations, (5) Waste Banks and TPS3R in Makassar City can improve the economy society and reduce unemployment.

Ningsih et al (2020) show that 56% of the 3R-based waste management sites function well, and 44% function poorly. Based on the Chi-Square test, shows that there are factors related to the functioning of the 3R-based waste management site. They are knowledge, attitudes, community participation, and local government support. Based on the linear regression test, shows that community participation (95% CI: 0.815-9.661) is the most dominant factor related to the functioning of the 3R-based waste management site which is controlled by the knowledge, attitude, and support of the local government. The conclusion of this study is to improve the function of the 3R-based waste management site in Jambi City, community participation needs to be developed by increasing education about the 3R concept of waste management, as well as increasing local government support through guidance on waste. the importance of a 3R-based waste management site in Jambi City.

The City Government of Bandar Lampung has made Regional Regulation Number 05 of 2015 concerning Waste Management in the City of Bandar Lampung. This regulation was ratified on 12 September 2015. In Article 20 Paragraph 1 which contains waste reduction with activities to limit waste generation (reduce), recycle waste (reuse), reuse waste (recycle). Through this Bandar Lampung City government regulation, it is hoped that the community can manage their waste so as to reduce the accumulation of waste in the TPA.

RESEARCH METHODS

The research was conducted in Bandar Lampung City in November 2021. In this study, the development of waste processing facilities with a Cost Benefit Analysis approach was carried out. The average amount of waste generation in Bandar Lampung City is carried out by calculating the total generation of household waste plus the total of non-household waste generation multiplied by its equivalent. Sampling was carried out to determine waste generation by using SNI 19-3964-1994. Observation of the existing condition of the waste management system in Bandar Lampung City is intended to explain technically the amount of waste and the facilities currently used. In the analysis stage, two scenarios are planned, namely Scenario A (business-as-usual) and Scenario B (waste processing using TPS-3R). In scenario A, it is carried out based on actual conditions, where the facilities used are TPS (containers) located on Jalan Pulau Seram, Kali Raman Jagabaya II. The impact
given by scenario A is a significant increase in investment and operational costs. Meanwhile for scenario B, development is carried out by adding processing facilities, namely TPS-3R which serves 500 families until 2025. This scenario is carried out by combining the concepts of recycled materials and sustainable waste management. For indirect costs are costs of environmental pollution such as emissions generated through the process of collection, transportation and reprocessing. In Scenario B, the benefits will be given from the value of the compost product [14] as well as reducing CH4 emissions. The CBA method used is described in terms of a cost and benefit assessment. The development of waste processing technology scenarios can be analyzed in three stages, namely the identification of the costs and benefits of the waste processing business, quantification of all costs and benefits into monetary value, and analysis of all costs and benefits. How to find out if the investment planning of a waste processing activity is economically feasible or not, can be explained if BCR 1 then the investment is feasible (feasible); and if BCR < 1 then the investment is not feasible. When the BCR shows a negative result (less than one), it means that the waste processing facility can still be continued. However, there is a need for subsidies for investment costs and maintenance operations where waste processing facilities are essential for better environmental sustainability. Meanwhile, if the BCR value is more than one (positive), then the planned processing facility can be feasible and provide economic and environmental benefits.

RESULTS AND DISCUSSION

The pattern of waste management in Bandar Lampung City still uses the direct collection method (door to door) and is directly accommodated in the Bakung TPA, which uses the open dumping method without any further management. The problem of waste that never finds a solution lies in the waste management system that is not handled properly. To find out about the performance of waste management in Bandar Lampung City, it is necessary to conduct this research in order to examine/measure the performance of waste management services in Bandar Lampung City. It is intended that after knowing its performance, it becomes a development direction to improve the performance of waste management in Bandar Lampung City.

Residue or waste (garbage) is a source of pollution which is an inseparable part of economic activity and will increase in line with the increase in these activities. Therefore, pollution is a pervasive phenomenon (will continue to exist) as a result of economic activity. In terms of resource economic principles, the best way to deal with pollution is how to control the pollution to the most efficient level.

<table>
<thead>
<tr>
<th>No.</th>
<th>Garbage Type</th>
<th>Average Waste Generation (Kg/Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leftovers / Bones</td>
<td>1,595</td>
</tr>
<tr>
<td>2</td>
<td>Leftover Vegetables</td>
<td>30,979</td>
</tr>
<tr>
<td>3</td>
<td>Paper</td>
<td>5,850</td>
</tr>
<tr>
<td>4</td>
<td>Wood</td>
<td>1,070</td>
</tr>
<tr>
<td>5</td>
<td>Can</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Plastic</td>
<td>6,789</td>
</tr>
<tr>
<td>7</td>
<td>Bag</td>
<td>414</td>
</tr>
<tr>
<td>8</td>
<td>Broken Bottle/Glass</td>
<td>24</td>
</tr>
<tr>
<td>9</td>
<td>Foam</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>46,747</td>
</tr>
</tbody>
</table>

Source: Bandar Lampung City Environment Service 2020

The economic value of market waste in Bandar Lampung City will occur if market waste management uses the Reduce, Reuse, Recycle (3R) concept. With the 3R concept, the waste will be separated so that organic and non-organic waste is obtained. Waste that has been sorted has a selling price for waste that is economically beneficial (Imam & Enro, 2020).

Based on BPPT research, waste components that have a high value to be
reused are paper, metal and glass waste (Oswarii et al, 2006). The government has issued the Waste Management Law no. 18 of 2008 which encourages waste management directly from the source. Sources of waste based on the law are the origin of waste generation, such as households, markets, industries, shopping centers, offices and so on. The Waste Management Law also explains the importance of 3R (Reduce Reuse, Recycle) activities so that the volume of waste does not continue to increase.

Referring to the two laws and regulations and to achieve the Sustainable Development Goals (TPB) / SDGS (Sustainable Development Goals) in promoting the principle of sustainable use of natural resources, the City Government of Bandar Lampung undertakes waste management efforts consisting of waste reduction and waste handling. Waste reduction carried out includes several activities:

a. Waste generation restrictions
b. Garbage recycling
c. Waste reuse

Conceptually, waste management activities that can be carried out at the individual household level include sorting, composting, biogas, making handicrafts made from raw waste and collecting recyclable materials in waste banks and TPS-3R (Wahyono, 2018). Bandar Lampung City has implemented a Waste Bank and TPS-3R well in waste management, such as in TPS-3R Teluk Betung District, Sukarame II Village, Sukapeace Village and Kec. Rajabasa. The management of TPS-3R is carried out by KSM (Community Self-Sufficiency Group), the investment costs of TPS-3R are sourced from the government and mutual assistance from the community by paying agreed fees.

The city government of Bandar Lampung has a strategy to encourage and educate the public to handle waste through government programs as an effort to develop the city of Bandar Lampung. According to Parwoto, community participation is the involvement of community members in the development and implementation of development programs or projects carried out in local communities (Siti, 2011). The government took a persuasive approach to the community by providing room for discussion and understanding about the management and work system at the 3R TPS. Involving the community in the management structure to convince the community to be involved in the construction and management of the 3R TPS while at the same time making a schedule of socialization regarding the use of waste so that it becomes useful goods that have economic value in the community.

CONCLUSION

Bandar Lampung city waste management efforts consist of phases of generation, collection, collection, and transportation that have not used the concept of waste reduction and waste management as mandated in Law Number 18 of 2008 concerning waste management and Bandar Lampung City Regional Regulation Number 5 of 2015 concerning waste management. In Bandar Lampung City by implementing 3R TPS that the place where collection, sorting, reuse, recycling, and processing activities are carried out on a regional scale, the area of the 3R TPS is greater than 200 m², the placement of the 3R TPS location is as close as possible to the service area within a radius of not more than 200 m². 1 km equipped with a sorting room, composting organic waste, warehouse, buffer zone, does not interfere with aesthetics and traffic as well as the area-scale integrated waste management work area (TPS3R) which includes areas for unloading carts, sorting, chopping waste, composting, residue bins/containers, storage of stall goods or sorted goods, and washing.
Socialization as a solution and an effort to invite the community to participate in the management of 3R TPS. Waste segregation carried out at TPS-3R involves several types of waste such as paper, plastic, metal/glass waste which are used as recycled materials so that goods become synthetic and have economic value, as well as organic waste as raw material for compost to prevent environmental pollution.

REFERENCES


