# Effectiveness Of Waste Management At The Hamlet Level In Mamasa Village Mamasa Regency

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## Abstract

Population growth and changes in people's consumption patterns lead to an increase in the volume, types and characteristics of increasingly diverse waste. This increase in the amount of waste that is not followed by the repairment and improvement of waste management facilities and infrastructure has resulted in a complex waste problem. Therefore, one of the efforts that can be applied to overcome the waste problem is by taking a source approach. In this approach, waste will be handled (managed) at the upstream (source) before it reaches the landfill (downstream). Ways that can be done include sorting the waste and also the 3R (reduce, reuse and recycle) program. This study aims to determine the effectiveness of waste management at the hamlet level in Mamasa Village, Mamasa Regency. This study uses a descriptive qualitative approach with data reduction analysis. The results showed that the effectiveness of waste management was 37.5% and the effectiveness of waste reduction was 42%. The study concluded that the effectiveness of waste management at the hamlet level in Mamasa village was not very effective.

## Introduction

Population growth and changes in people's consumption patterns lead to an increase in the volume, types and characteristics of increasingly diverse waste. This increase in the amount of waste that is not followed by the repairment and improvement of waste management facilities and infrastructure has resulted in complex waste problems. The waste problem never ends and is a serious problem, especially in big cities in Indonesia. If waste enters the environment (water, air and soil) then the quality of the environment will decrease. This process of waste entry into the environment is known as an environmental pollution phenomenon. The waste problem is a challenge that will determine the environmental sustainability of a city. Failure to deal with this waste problem will increase the risk of the city residents dealing with various kinds of diseases that will increase the social costs of health.

Up to this point, some people still adhere to the old paradigm in waste management, namely waste is collected, transported and then disposed of in the landfill. Therefore, one of the efforts that can be applied to overcome the waste problem is by taking a source

approach. In this approach, waste will be handled (managed) at the upstream (source) before it reaches the landfill (downstream). Ways that can be done include sorting the waste and also the 3R (reduce, reuse and recycle) program.

In Mamasa Regency itself, landfill facilities have been provided by the Regency Government and have been effectively used, including transport personnel, infrastructure for collecting and transporting waste. However, there are irresponsible parties who still littering in random places such as rivers. This kind of community culture is difficult to change because of a hereditary habit and thus waste ends up in the sea instead of in the landfill. In addition, the waste that is dumped into rivers and sewers has the potential to cause flooding, where the community itself suffers the most. Mamasa Village is also the capital of Mamasa Regency which should be arranged in such a way as to be an example for other villages and sub-districts in Mamasa Regency in terms of waste management. Therefore, Mamasa Village has a high enough urgency to reduce and manage waste so that it can set an example to reduce waste problems in Mamasa Village in particular and Mamasa Regency in general. This study aims to determine the effectiveness of waste management at the hamlet level in Mamasa Village, Mamasa Regency.

## Materials and Methods

This study uses a qualitative approach with a descriptive method. The technique of collecting data from respondents/informants used in this research is purposive sampling technique. Sources of the data are obtained from primary and secondary sources.

### Primary data

Primary data is data that is directly collected by researchers from the original source. The source of primary data in this study was obtained directly from the place where the research was carried out, namely in the form of direct interviews with employees of the Housing, Settlement and Land Office of Mamasa Regency, Mamasa District Environmental and Forestry Service Officer, Head of Mamasa Village, garbage collectors, Mamasa Village community as many as 4 (four) respondents per hamlet or as many as 24 respondents.

### Secondary Data

Secondary data is data that is not directly from the community, but from reading sources related to the problems in this research as well as other supporting data related to research from related agencies. In this study, the data collection techniques that the author uses consist of 3 (three) methods, namely: observation, interviews and documentation.

### Data Analysis Technique

The data analysis technique used is descriptive qualitative, consisting of three flow of activities that occur simultaneously, namely: data reduction, data presentation, and conclusions drawing or verification. (Miles, MB., 2001). In this study, data analysis was carried out using these following techniques:
a. Data Reduction

The data obtained through observation and documentation were collected, selected, and grouped and then concluded without eliminating the existing data. Reducing data means summarizing, choosing the main things that are important, looking for themes and patterns. Collecting data that are obtained from observations, interviews and documentation.

b. Data Presentation

The presentation of data in qualitative research used by researchers is by making narrative texts. The presentation of this data is carried out in the form of a brief description, compiling all the data obtained in accordance with the planned discussion.

c. Conclusion and Data Verification

Conclusions making and data verification is done by means of data that has been arranged and patterned systematically and then concluded by researchers so that meaningful conclusions are obtained from the data that has been obtained. Verify the data that has been collected to be used as the basis for drawing conclusions.

## Effectiveness Analysis

The analytical tool used to measure the effectiveness of waste management is a formulation that emphasizes the compatibility between the objectives and results of program implementation. Subagyo (2000) explains that the level of effectiveness can be calculated using the following effectiveness formula:

$$\text{Effectiveness} = \frac{R}{T} \times 100\%$$

Explanation:
R = Realization
T = Target

## Validity Test/Data Validity Test

To avoid mistakes or errors in the data that has been collected, the researcher needs to check the validity of the data by means of triangulation techniques, namely the technique of checking the validity of the data based on something outside the data for the purpose of checking or as a comparison against existing data. Triangulation in testing the validity of this data is defined as checking data from various sources in various ways, and at various times. With triangulation, researchers will mention sources, documents, and techniques (Widiyanto et al, 2017).

# Results and Discussion

## Mamasa District Profile

Astronomically, Mamasa Regency is located between 2°39'216'' South Latitude and 3°19'288''South Latitude and between 119°0'216'' East Longitude and 119°51'17'' East Longitude. Mamasa Regency is 1 of 6 regencies in West Sulawesi Province, with an altitude of 3000 meters above sea level (masl). The area of Mamasa Regency is 3,005.88 km2. According to data from Mamasa District in Figures 2020, in 2019 the population of Mamasa District was 27,292 people (SP2010). In 2019, the area of Mamasa Village is 7.11 km2 which consists of 6 (six) Hamletsthat are villages with the largest population, which is 5,272 people.

## Respondent Profile

Based on the results of the questionnaire processing, the profile of the respondents who became the sample in this study was obtained. Based on the age, of 24 respondents the age below or equal to 50 years (≤ 50) consist of 15 people or 62.5%. This number is

relatively larger than the age above 50 years (> 50) which amounted to 9 people or 37.5%. Based on the gender of the respondents, there are two gender namely male and female. After the questionnaires were distributed to 24 respondents, the results showed that the respondents were dominated by 14 women or 58.33% and just 10 men or 41.67%.

Based on the education level of the respondents, most respondents have high school education and college education of 10 people each or 41.67%, followed by respondents with elementary school education as many as 3 people or 12.5% and junior high school as many as 1 person or 4.17%. Thus, most of the respondents who were sampled in this study had high school and college education (Bachelor).

According to the respondent's profile based on occupation, it shows that respondents who work as civil servants/retirees dominate as many as 11 people or 45.83%, entrepreneurs as many as 9 people or 37.3%, followed by respondents who work as housewives as many as 2 people or 8,335% and Farmers and General Elections Commission of Indonesia each 1 person or 4.17% each. Based on the number of family members, the results showed that respondents who were below or equal to 5 people (≤ 5) were more dominant, namely 14 people or 58.33% and respondents with the number of family members above 5 people (> 5) were 10 people or 41.67%. For more details, see Table 1 below.

**Table 1. Respondent Profile**

| Personal Background | Frequency | Percentage (%) |
|---|---|---|
| **Age (Year)** | | |
| ≤ 50 | 15 | 62,5 |
| > 50 | 9 | 37,5 |
| Total | 24 | 100 |
| **Gender** | | |
| Male | 10 | 41,67 |
| Female | 14 | 58,33 |
| Total | 24 | 100 |
| **Pendidikan** | | |
| Elementary | 3 | 12,5 |
| Junior High | 1 | 4,17 |
| High | 10 | 41,67 |
| University | 10 | 41,67 |
| Total | 24 | 100 |
| **Occupation** | | |
| Entrepreneur | 9 | 37,5 |
| Civil servants/retiree | 11 | 45,83 |

| | | |
|---|---|---|
| Farmer | 1 | 4,17 |
| Housewives | 2 | 8,33 |
| General Elections Commission | 1 | 4,17 |
| **Total** | 24 | 100 |
| **Number of Family Members (Persons)** | | |
| ≤ 5 | 14 | 58,33 |
| > 5 | 10 | 41,67 |
| **Total** | 24 | 100 |

Source: Questionnaire Results - Processed by the Author.

### Waste Management in Mamasa Village, Mamasa Regency

Waste management aims to improve public health and environmental quality and turn waste into a resource. According to Damanhuri and Padmi (2015), the success of management does not only depend on technical aspects, but also includes non-technical aspects.

a. Legal and Regulatory Aspects

The legal basis for waste management that has been issued by the Mamasa Regency government is 1) Mamasa Regent Regulation No. 12a of 2007 dated April 2, 2007 concerning Guidelines for Implementing Minimum Standards in the Waste Sector. 2) Mamasa Regent Regulation Number 06 of 2019 concerning Regional Policies and Strategies in the Management of Household Waste and Waste Similar to Household Waste. This regent regulation has not been socialized until the end of 2020, so the implementation of the regulation does not run optimally. According to the Head of Waste Management, B3 Waste and Capacity Building for the Environment and Forestry Agency of Mamasa Regency, this is due to the diverted funds for handling Covid-19. Even if it is budgeted, the funds are very minimal. The Head of Mamasa Village hopes that this regulation will soon be socialized so that a waste management mechanism can be formed and can involve the village party.

According to the results of interviews conducted by researchers at the hamlet level in Mamasa Village, there are only a portion of the community, namely around 21% of the total respondents (5 respondents out of a total of 24 respondents) who know that there is a Regional Regulation on Waste Management, and even then, they do not specifically know about the Waste Management Regulation that is issued. In this case, one of the respondents understands the waste management regulation, which is about sanctions for irregular waste disposal, in this case the rules/sanctions for throwing garbage anywhere, in accordance with the mandate of Law Number 18 of 2008 concerning Waste Management.

According to the Mamasa Village Head, the existence of sanctions that are not yet strict on waste management has caused some people to still litter, such as the habit of throwing garbage into rivers. The recommendation to dispose of garbage in its place is only an appeal without clear rules/sanctions for people who violate it. This can be seen from the garbage that is still found piling up and even carried away by river flows which can potentially cause flooding and damage to aquatic ecosystems. Rivers that are often polluted

by garbage from the community are the Mamasa River and the Tatoa River that pass through Mamasa Village.

Laws and regulations are based on the fact that Indonesia is a country of law, where the joints of life rely on applicable laws. Municipal solid waste management in Indonesia requires strength and a legal basis, such as the formation of organizations, collection of retribution, public order, the responsibilities of each agency, individual and so on (Anas, 2017). To achieve this, the central government, provincial and regional/district governments must establish policies and strategies for waste management in accordance with the hierarchy of authority, and for now the Provincial Government of West Sulawesi and the Regional Government of Mamasa Regency have not issued a local regulation on waste management.

b. Financing Aspect

Regarding the levy on waste management in Mamasa Regency, Regional Regulation Number 02 of 2007 that was issued on August 14, 2007 concerning the levy for cleaning services. The collection of user fees for waste services is carried out by the collector of the cleaning section staff in the waste section according to the results of an interview with Mr. Kombas as the driver of the garbage transporter. The results of this waste retribution are managed directly by the housing office according to the results of an interview with the Mamasa Village Head. The levies collected vary based on the categories contained in the above regulations, namely large, medium and small categories of waste generated by households, restaurants, hotels, markets and offices. In accordance with the statement as the Head of the Cleanliness Section of Mamasa Regency.

From the results of interviews conducted by researchers at the hamlet level in Mamasa Village, there were 38% of respondents (9 respondents) who admitted that they routinely paid the retribution every month according to the categories stipulated in Regional Regulation No. 02 of 2007, there were 53% of respondents (13 respondents) who admitted they never paid a levy and 8% of respondents (2 respondents) who claimed to have paid a levy but never again received a bill from a cleaning collector. Residents who routinely receive bills are generally residents who are on the main road that is traversed by a transport fleet whose waste is picked up directly from the household. However, some of the respondents who never received a bill came from hamlet 01 to hamlet 04, while the majority came from the hamlet 05 and hamlet 06 areas admitted that they had never received a retribution bill. In these two hamlets, there is 1 laystall which becomes a dumping ground for the people around the hamlet. According to residents, they are ready to pay every month, with the hope that garbage in people's homes and at laystall is routinely collected by garbage officers. They also hope that if the garbage is not picked up at the household, the capacity of the laystall should be enlarged for areas that already have laystall.

If waste management is carried out at the source (decentralization) then the financing will be fulfilled from the residents' waste retribution. This means that the polluter fine principle (polluters must pay) has been fulfilled so as to support sustainable management from the economic aspect. However, if waste management is carried out conventionally (centralized) then a special subsidy is needed from the local government. The cost of waste management at the source is cheaper and more effective than the costs that must be incurred for conventional waste management which is purely based on landfill. The cost becomes cheaper because the waste that must be transported to the landfill is

reduced so that the costs for transportation and disposal are reduced. The cost becomes more effective because one rupiah allocated for waste management at the source will have a greater impact than one rupiah allocated for conventional waste management. Even the waste management brings economic added value that can be enjoyed by the actors who are active in it (Utami, B., D., et.al, 2008).

The general problem that is often encountered in financing is that the collected retribution is very limited and not commensurate with the operational costs, the existing authority and organizational structure are not entitled to manage their own funds and the levy tariff arrangement is not based on the correct method. Retribution from the field of cleanliness is one source of Original Local Government Revenue in a region. Taking into account the number of customers around 1,016 in Mamasa Regency, this indicates that the number is still relatively small. The relatively small amount of retribution results in fulfilling the need for waste management is still a big burden for the government.

The amount of the waste retribution is 1% of the income per household. Thus, the amount of retribution for waste varies according to the level of income, the higher the income of a household, the greater the retribution they have to pay because the higher the economic level of a person, the greater the waste produced (Anas, 2017). However, for the Mamasa Regency scale, the regulation on financing, in this case retribution, refers to Regional Regulation No. 02 of 2007 concerning Cleaning Service Retribution, namely the levy collected varies based on large, medium and small categories of waste generated by customers. However, for the household scale, the tariff is the same, namely Rp. 2000, - per month, regardless of their income level.

Basically the government needs to make policy breakthroughs, especially in this financing, such as making regulations at the regional level where local governments can get a special portion of financing or through private and other assistance by empowering and fostering as well as providing operational funding assistance to 3R laystall and waste banks. In accordance with the results of interviews in this study, in general, people admit that waste management is carried out by the government without cooperation with the private sector.

c. Operational Aspect

Garbage is basically generated by or is a consequence of human activities. Every human activity always produces waste or waste whose amount and volume are proportional to our level of consumption of goods and materials that we use daily. Likewise with waste, it really depends on the lifestyle and the type of material we consume.

Based on the SNI 19-2454-2002 standard, waste receptacle is an activity to temporarily accommodate waste in an individual or communal container at the source of the waste. This storage is carried out on waste that has been sorted, namely organic, inorganic and hazardous toxic waste. The pattern of accommodation consists of individual patterns and communal patterns.

From the interviews, it was found that in general, the community prepared their own containers in the form of buckets, plastic and sacks. Garbage is put together in containers that will be transported by officers without distinguishing between organic, inorganic and B3 waste.

The requirements for the container material are durable and waterproof, easy to repair, light and easy to lift and economical, easy to obtain or make by the community. Communal waste containers are procured by the management agency while individual containers are provided by individuals or management agencies (Syafrudin and Priyambada,

2001). The purpose of the container is to make it easier to transport and in addition to using this container, the odor due to decaying garbage which can also attract the attention of flies can be overcome, rainwater which has the potential to increase the water content of the waste can be controlled and mixing of dissimilar waste can be avoided (Rahardyan et al. Widagdo, 2005).

Until now, the Mamasa Regency government has not been able to handle the solid waste problem thoroughly to the villages and even the garbage around the Mamasa Regency capital has not been fully handled properly. One of the factors that causes this to happen is the limited infrastructure owned by the Waste Section which has impacted in several routes and areas that are not served.

Waste handling is only in the capital area of Mamasa District with a service area of around 1016 objects. The service areas that have been served by the Mamasa Regency waste management system currently include residential areas, offices, markets/shops, inner-city roads, religious facilities, tourist facilities, schools and others with large, medium and small categories. This service is carried out mainly in urban areas/district capitals, and even then it is only limited to collection and transportation to laystall and disposal to landfill without any management from upstream, namely segregation from households or management at integrated laystall and 3R laystall.

In some areas, especially slum and congested areas, waste collection services are not carried out properly, due to the lack of a garbage collection fleet, the distance from the house which is the source of the waste is far from the collection location, as well as the difficulty of accessing roads outside the city of Mamasa and the lack of public awareness of cleanliness. Some of the waste generated in the environment is burned and most of it is disposed of in ditches/rivers, which can cause channel blockages and potentially cause flooding and inundation.

Facilities in the form of a garbage collection fleet consisting of 2 (two) trucks and 2 (two) motorcycles with poor vehicle conditions. Previously there were 5 (five) motorbikes and 2 (two) trucks that could reach the city's garbage transportation, but 3 (three) motorbikes were no longer usable (totally damaged), causing a lot of complaints from the community due to the garbage cannot be handled optimally. Trash cans that are used to collect garbage from people's homes are also still being prepared privately because there is no procurement from the government/private sector. The community's willingness to prepare trash containers/bins is a form of community participation in waste management (Yudianto, et al, 2021). Trash cans should conform to standards consisting of 2 or 3 types, namely: organic waste, inorganic waste and B3 waste. But in reality it has not been implemented in Mamasa Village.

The schedule for transporting waste is 1 trip per day. Motorcycles carry out door to door transportation, while trucks carry garbage from laystall and also door to door at residents' homes which are carried out according to the distribution area zone starting at 06.00 until finished. In residential areas that can be reached by garbage collectors managed by the Department of Housing, Settlement and Land Affairs of Mamasa Regency, the community collects waste in front of their respective homes and will be transported by officers, some of them take the waste to the nearest laystall which will then be transported by the transport fleet to the Salubue landfill.

Garbage in laystall has not been handled, several 3R laystall are already available but have not been able to reduce waste generation before being disposed of to the landfill because they are not operating properly. The location of the landfill in Mamasa Regency is

located in Salubue, Rantepuang Padang Village, Mamasa District, with a landfill area of 2,480 m2, the distance from the landfill to the nearest settlers is 200 m and the distance from the landfill to the nearest river is 700 m.

d. Institutional Aspects (Institutions)

Waste management cannot be separated from the role of institutions. Waste management basically involves stakeholders, namely the waste-producing community, NGOs, the private sector, local governments and the central government. Each of these stakeholders has a role in waste management (Puspasari and Mussadun, 2016).

So far, Mamasa Village Office has not played a significant role in waste management. According to the Mamasa Village Head, the Village Office is only a source of information from the government to the community or vice versa regarding waste management. Furthermore, he hopes that there will be a synergy between the Regency Government and the Village Office in terms of waste management. When the party in charge of cleaning will plan or hold activities related to waste management in the Mamasa Village area, it should involve the Village Office.

The government's role in waste management is very important, because good waste management is a manifestation of the form of urban infrastructure services to the community. The crucial problem of waste management in Mamasa Village is the less than optimal performance of the institutions that play a role in waste management. The Village Office still does not have a strategic role in waste management even though this institution has a very close position and is in direct contact with the community. So far, the sub-district only continues the appeal from the office that handles solid waste. The waste and cleanliness section which used to be in the Department of Housing, Settlement and Land Affairs, Mamasa Regency, but since January 2021 has joined with Environment and Forestry Agency of Mamasa Regency is considered the most responsible institution in waste management in Mamasa Regency. Environment and Forestry Agency is tasked with carrying out the transportation and processing functions at the end, but the number of fleets and personnel owned is very limited. In addition, the volume of waste produced by the community continues to increase, even people have not done any sorting, and the waste is still disposed of in the conventional way (by burning, stockpiling, and throwing it anywhere). So that the burden of Environment and Forestry Agency's task becomes quite heavy. It is the hope of the community that Environment and Forestry Agency should involve the Village Office regularly to socialize about waste management so that a change in the mindset of the community in managing waste is formed through socialization (3R) and pioneering the procurement of waste banks.

The success of waste management cannot only rely on the role of the government, but community involvement in waste management can be the key to success in waste management. The community, as a source of household waste, must help the government in waste management. The community can play a role by not littering, not throwing garbage in the river, being able to sort organic and inorganic waste when disposing of garbage.

The role of the private sector is very much needed in waste management. The presence of the private sector in waste management can help ease the burden on the government. The role of the private sector in waste management can have a positive impact on municipal waste management, because at least the existence of the private sector is able to answer the problems faced by the government so as to create ideal waste management conditions. Although in reality the private sector has not played a role in waste management in Mamasa Village at this time.

e. Aspects of Community Participation

The level of public awareness and concern for waste is still very low. According to the results of interviews with the Mamasa Village community, the community has not fully reduced waste from the household in terms of implementing 3R and sorting organic and inorganic waste, which in turn burdens the landfill. There are 71% (17 respondents) who know that waste must be sorted but of these 17 respondents only 8 respondents (47%) implemented waste segregation. where wet waste (organic waste and baby diapers) is disposed of in the trash/laystall and dry waste (plastic, paper and cardboard) is burned. There are 8% (2 respondents) who stockpile wet waste and burn dry waste. In the pattern of landfilling, it will cause soil pollution if there is garbage containing hazardous substances classified as B3 waste that enters the soil around residential areas. Burning garbage will also cause air pollution, especially if it is carried out in densely populated residential areas/complexes, it can cause uncontrolled fires. According to Utami, et. al (2008), the waste incineration system needs to be avoided because it is harmful to human health. Burning waste at low temperatures can form toxic gases in the form of carcinogenic dioxins and furans as well as very small dust particles (particulate matter) that can cause Acute Respiratory Infection (ARI).

Some people still throw garbage in any place that causes the environment to become dirty, for example, baby diapers scattered on the road. Another phenomenon that also happen is that people still throw garbage into the river. There are 4% (1 respondent) who admitted to throwing garbage into the Tatoa River which is 5 meters away from their house. This waste is in the form of fish waste which cannot be stored for long because it will rot if it is not immediately disposed of. By looking at the phenomenon of the large amount of garbage scattered in the river, apart from intentional factors by irresponsible people who throw garbage into the river, there are also unintentional factors, for example on the Tatoa River there is one laystall located on the riverbank. This laystall is used by hamlet 05 and hamlet 06 Mamasa Village, and according to the residents around this laystall it is often also used by people from the 2 closest sub-districts, namely Tawalian District and Sesenapadang District, who happened to pass the laystall causing the waste in the laystall to exceed it's capacity. If it exceeds the capacity of the laystall, the garbage will be scattered and fall into the river.

Mamasa Village is traversed by 2 (two) rivers, namely the Mamasa River and the Tatoa River. Mamasa River is a large river with high water discharge. Mamasa River passes through the heart of Mamasa city and crosses several sub-districts and villages including Mamasa village, especially hamlet 1 and 2. In this river you can still see a lot of garbage carried by water and even piled up on the riverbank. The Tatoa River is a river that passes through hamlet 4, 5 and 6, and the upstream is located at hamlet 6. This river has a small discharge, so garbage is often found piling up in the river, which during the rainy season often floods due to the accumulated garbage in the river and due to silting of the river. This river passes through ± 2 villages and finally empties into the Mamasa River. According to the Mamasa Village Head, there was once a cleaning of the Tatoa river by involving school children in the hope that the community would be moved and aware not to throw garbage into the river but this was not enough to bring order to the community.

Disposal of garbage in any place, especially rivers, will detain the rate of rainwater on the surface so that the flow is only focused on one point. When the rainfall is high, this kind of condition can lead to flooding. The worries not only during the flood but also after the flood. Hunger, disease, unemployment, and other social problems become a homework

that must be solved (Silolongan and Apriyono, 2019).

Community involvement in waste management is an important asset given the volume of waste that increase every day, while at the same time the government does not have enough funds to use advanced technology in waste management (Prihatin, R.B., 2020). Without the participation of the community, all the waste management programs that have been planned will be in vain (Anas, 2017). Community participation in the waste management system can be divided into several levels based on the involvement or role of the community in it. The level of participation is applying the right habits when handling waste, participation in consultation activities on waste management, participation in administrative and management activities, is the highest level of community participation in the waste management system, participating in decision making during meetings related to waste management programs (Maulina, 2012).

According to the vision of the Environment and Forestry Agency of Mamasa Regency in point 3 it reads "Improving Waste Management to create a Clean Environment By Involving Community Participation". Therefore, the collaboration between the government and the community in terms of waste management must continue to be improved.

## Effectiveness of Waste Management at hamlet Level in Mamasa Village

Waste management with the new paradigm is carried out by waste management with waste reduction and handling activities. Waste reduction includes: restriction activities, reuse, and recycling. Waste handling includes: Sorting, collecting, transporting, processing, and final processing.

a.  Waste Reduction Effectiveness

As the largest source of waste disposal (household waste), the community needs to receive education about the importance of handling waste that is environmentally friendly and sustainable to help process waste from the source. Considering that the largest source of waste in cities in Indonesia is household organic waste, various recycling systems such as individual, communal and regional scale composting can be applied. In addition, the reuse of non-organic waste can be done with the waste bank program. For waste reduction, simple techniques such as reducing the use of single-use packaging and using biodegradable packaging.

From the results of interviews conducted by researchers, it was found that of the 24 total sample respondents, 16 respondents (67%) claimed to know about the 3R but only 6 respondents (37.5%) had started implementing the 3R. From a total of 24 respondents, only 9 respondents (37.5%) applied 3R in their waste management. The 3R programs that have been started by the community include limiting plastic waste, and using a tumbler when traveling.

$$\text{Effectiveness} = \frac{R}{T} \times 100\%$$

Explanation:
R = Realization
T = Target

$$\text{Effectiveness} = \frac{9}{24} \times 100 \%$$

$$\text{Effectiveness} = 37,5 \%$$

In accordance with the effectiveness measurement standard (Department of Agriculture Research and Development 1991) the value of the effectiveness of reducing waste below 40% is declared very ineffective, so for Waste Reduction in Mamasa Village it is classified as Very Ineffective with a value of 37.5%.

b.    Waste Handling Effectiveness

Waste segregation is a method of reducing waste. From the interviews conducted, it was found that 71% (17 respondents) claimed to know that waste must be sorted, as many as 42% (10 respondents) of the community had started sorting waste. Apart from the unavailability of containers/bins to separate the waste, it is also because people think that after separating this garbage, what will they do. Ideally, waste sorting is based on 3 (three) types, namely organic waste, inorganic waste and B3 waste. They generally sort paper, cardboard and plastic waste by burning and organic/wet waste and baby diapers to be disposed of in the trash/laystall.

Through interviews conducted, there were residents who claimed to know that waste must be sorted, but what to do after sorting it out. This indicates that public knowledge about waste management is still very shallow. This becomes an evaluation material for the government, private institutions or environmentalists to continuously disseminate information to the public regarding waste management. How do we treat the waste we produce? Garbage that is sorted from the house in the form of organic waste can be converted into compost and inorganic waste can be recycled into useful goods and has economic value because it can be sold. Another thing that can be done by the community is that inorganic waste in the form of cardboard, glass, used plastic bottles and papers that have been sorted by the community can be sold to collectors for economic value.

In order to reduce the volume of waste in landfills, Article 13 of the UUPS stipulates, "Managers of residential areas, commercial areas, industrial areas, special areas, public facilities, social facilities, and other facilities MUST provide waste sorting facilities". Furthermore, in the Elucidation of Article 13, "Settlement areas include residential areas in the form of clusters, apartments, condominiums, dormitories, and the like. The sorting facilities provided are placed somewhere that is easily accessible by the community. The intended sorting facilities are medium-sized facilities such as laystall that can reduce the amount of waste before it is transported to the landfill. The government will conduct socialization and will fix the completeness of the institutions at the 3R laystall and preparations for the development of Non-Governmental Organization (NGO).

The calculation of the effectiveness of waste reduction is as follows:

$$\text{Effectiveness} = \frac{R}{T} \times 100 \%$$

Explanation:
R = Realization
T = Target

$$\text{Effectiveness} = \frac{10}{24} \times 100 \text{ \%}$$

$$\text{Effectiveness} = 42 \text{ \%}$$

In accordance with the standard effectiveness measure (Department of Agriculture Research and Development 1991) the effectiveness value of 40%-59.9% is declared ineffective, so for Waste Reduction in Mamasa Village it is classified as Ineffective with a value of 42%.

**Waste Management Effectiveness**

To determine the Effectiveness Value of Waste Management in Mamasa Village, it can be determined by calculating the average value of the Effectiveness of Waste Handling and Effectiveness of Waste Reduction. The calculations are as follows:

$$\text{Average Effectiveness} = \frac{E_1 + E_2}{2}$$

Based on the results of the calculation of the Waste Handling Effectiveness of 37.5% and the Effectiveness of Waste Reduction of 42%, the average value of 39.75% is obtained. In accordance with the standard effectiveness measure (Department of Agriculture Research and Development 1991) an effectiveness value below 40% is declared very ineffective, so in general the effectiveness of waste management in Mamasa Village is classified as Very Ineffective

# Conclusions and Suggestion

**Conclussion**

From this study it can be concluded that the effectiveness of waste management at the hamlet level in Mamasa Village, Mamasa Regency is Very Ineffective.

**Suggestion**

It is necessary to improve the quality of work of the janitors, to improve waste management infrastructure and to supervise the implementation of regulations on waste management.

Public awareness must be increased by providing counseling or socialization about waste management and there must be a cooperation between the community and the government in terms of waste management.

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