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Waste Management Model in Gamalama Village Ternate City

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Abstract: This research aims to identify waste management models and public perceptions about waste in Gamalama Village, Central Ternate City. This research used a qualitative descriptive. Data collection was carried out through interviews, questionnaires, documentation and testing the validity of the data using the triangulation method. The research results show that the volume of waste in Gamalama sub-district increased by 514,834 m3/day, and 187,914,319 m3/year. Waste management still uses the old model, namely picking up the source of the waste at the TPS and continuing it to the TPA. This risks of accumulation waste made people have a negative perception about waste management in Gamalama sub-district. Gamalama Village should implement the 3 R model (reuse, reduce and recycle) which can process waste into useful and economically valuable goods, and ultimately waste can be handled from upstream to downstream.

Keywords: Waste Management Model, Community Perception, Gamalama

INTRODUCTION

Humans have various activities to fulfill their daily needs. They can produce goods that are used, such as food, clothing, and housing, or other furniture, these activities also produce waste that must be disposed of. According to WHO (World Health Organization), waste is unused, unwanted material, or something that is thrown away that comes from human activities. Waste can be interpreted as solid material left over from industrial processes or household activities (Ikhtiar, 2017).

Waste that is not managed properly will cause environmental pollution (soil, water, and air). Environmental pollution is a situation where the environment hurts the lives of living creatures (Dewata & Danhas, 2023). Waste management aims to improve public health, environmental quality, and turn waste into a resource. From an environmental health perspective, waste management is considered good if the waste does not become a medium for breeding disease germs and the waste does not become an intermediary medium for the spread of disease. Other requirements that must be met are that it does not pollute the air, water, and soil, does not cause odors (does not interfere with aesthetic values), does not cause fires and, so on (Nitikesari, 2005).

To realize good waste management, the government issued several policies such as Law Number 18 of 2008 concerning waste management and Government Regulation Number 81 of 2012 mandating the need to change the waste management paradigm, namely the need for a paradigm shift in waste

management, namely the paradigm of collecting-transporting-disposing of to processing that is based on waste reduction and waste handling.

This paradigm shift encourages an innovative and efficient waste management system, such as participatory-based home industry waste management (Olivia et al., 2019), environmentally-based waste management and the use of the 3R concept (reuse, reduce, recycle) can inspire residents to use waste as an opportunity to increase their income while protecting their environment (Rapii et al., 2021).

Urban settlements are the largest waste producers, approximately 60-70% of the total waste generation (Kustiah, 2005). Waste is still a problem due to the lack of effective waste management systems. Some of the causal factors are public awareness and community habits.

The community education factor determines awareness of waste management because it can encourage someone's awareness in participating in waste management (Gafur et al., 2017). In line with this, (Mahyudin et al., 2015) stated that the main problems with waste are paradigm, behavior, and awareness. Community awareness and habits are also factors that determine success in waste management.

People who lack understanding will throw rubbish carelessly (Elamin et al., 2018). Therefore, (Affandi et al., 2015) stated that accustoming people's behavior to the waste program is changing people's perceptions of orderly, smooth, and even waste management, changing people's habits regarding poor waste management and social factors, local structure and culture.

The city of Ternate shows ineffectiveness in waste management because it sees piles of rubbish on the roadside and laystall. It caused public complaints because the piled-up rubbish pollutes the stench and reduces the beauty of the environment. Gamalama Village is an economic area of Ternate City, but the waste problem is still a public complaint.

Based on the problems above, it is necessary to conduct research on waste management in Gamalama Village, Central Ternate City. This research aims to: 1) identify the waste management model in Gamalama Village, Central Ternate City: and 2) determine the public's perception of waste in Gamalama Village, Central Ternate City.

LITERATURE REVIEWS

1. Waste Management Model

Overcoming the waste problem requires a paradigm shift from an end-pipe of solution approach to a source approach. With a source approach, waste is handled upstream before the waste reaches the final processing site (downstream) (Abdul & Syafrudin, 2018). The sourcing approach requires a reduction in waste products that will be sent to the final processing site (Kouloughli & Kanfoud, 2017).

The ways that can be taken to reduce waste include waste sorting and implementing the 3R model or reducing, reusing, and recycling waste. Using the 3R model (reduce, reuse, recycle) can inspire residents to use waste as an opportunity to increase their income while protecting their environment.

Furthermore, an effective model for waste management is a participatory model, as stated by (Olivia et al., 2019) waste management for the home industry should be participatory-based so it can help government programs successfully deal with waste

problems. Community participation is very important so that the community becomes accustomed to behavior that is following the waste program, namely changing people's perceptions of orderly, smooth, and even waste management, changing people's habits in poor waste management and local social, structural, and cultural factors (Ulfah, 2022).

A participatory-based approach is the mandate of Law No. 23 of 1997 concerning the Environment, Article 16 mandates that the community is responsible as a producer of waste generation. It is hoped that the community, as a source of generation that is at risk as a source of pollution, will participate in the waste management system.

Based on the mandate of this law, waste management should be carried out through community empowerment (Pratama et al., 2021), by collaborating with various companies in distributing CSR. Community empowerment is one of the efforts and methods that can be used by companies to create conditions for active, participatory, and independent communities (Ramada et al., 2020). Research Management (Muryani et al., 2020) suggest that one community-based waste management using a community model is formed through a series of activities, namely: (1) Coordination with RT administrators, hamlets, and community leaders; (2) Socialization and education about waste management and waste banks; (3) Education and provision of waste sorting facilities; (4) Training on making compost, making various recycled creations from plastic waste, and making candles from used cooking oil.

People who join this community are gradually encouraged to manage waste consciously and independently, implementing the 6M and 2TM, namely: reducing potential waste, utilizing waste, recycling waste, sorting waste, saving waste, minimizing residual waste going to landfill, do not throw rubbish into the river, and do not burn rubbish (Revision et al., 2023).

2. Waste Management System

The waste management system is a component that supports each other to achieve goals (Hikmat Maulana, 2019). There are five aspects of the waste management system, namely operational technical aspects, organizational and management aspects, legal and regulatory aspects, financing aspects, and community participation aspects. Waste system planning requires a standard pattern of specifications as a clear basis (Mery et al., 2022).

The specifications used are NSI Number 19-2454-2002 concerning procedures for managing waste in residential areas. Operational techniques for waste management are integral and integrated in a continuous sequence, namely: storage/containment, collection, transfer, transportation, and disposal/processing.

Waste storage is a place where waste is collected before it is transported and disposed of to the landfill. The aim is to prevent rubbish from being scattered so that it does not disturb the environment. The factors that most influence the effectiveness of service levels are equipment capacity, storage patterns, type and nature of materials, and placement location (Faizah, 2008). Waste collection is the process of taking it from a waste storage area to a temporary disposal site. Waste collection patterns are grouped into 2 (two), namely individual patterns and communal patterns:

1. Individual Pattern. The waste collection process starts from the waste source,

then transported to a temporary disposal site/TDS before being disposed of at the landfill.

2. Communal Pattern. Waste collection is carried out by waste producers to the communal waste storage areas that have been provided/to the waste trucks that handle the collection points and then transported to the landfill without a transfer process.

RESEARCH METHODS

This research uses a qualitative descriptive approach, a research that examines carefully and systematically, describes the phenomenon of waste management in Gamalama Village, Central Ternate City. Ternate City has 46 sub-districts consisting of 17 sub-districts in South Ternate District, 14 sub-districts in North Ternate District, and 15 sub-districts in Central Ternate District, including Gamalama sub-district which is the research area.

The research period is two months starting from November to December of 2023. Data collection was carried out through interviews, questionnaires, and documentation. Data validity testing is carried out using the triangulation method with data sources and/or data collection methods.

This triangulation method is carried out by cross-checking a phenomenon, data, and information using different sources and methods. Information from interviews with respondents as a data source is confirmed with other sources such as documentation data and observation results (Lexy J. Moleong, n.d.). The data obtained through the questionnaire was identified, compared with the interview data, and then interpreted to conclude. The questionnaire is made in the form of questions accompanied by alternative answers consisting of four categories, this is to make it easier for respondents to provide answers. Filling out the questionnaire by respondents was carried out under the supervision of researchers to avoid misperceptions and provide direct information on sentences that were difficult for respondents to understand.

RESULTS AND DISCUSSION

1. Public Perceptions About Waste

Gamalama Village is located between 0° 46'32.22" - 0° 48'53.99 " North Latitude, and 127° 20'44.40" - 127° 23'28.97" East Longitude . The north borders East Makasar Village, the South borders Muhajirin Village, the West borders Kalumpang and Santiong Villages, and the East borders the Halmahera Strait (Central Ternate in Figures, 2023).

The volume of waste in Gamalama subdistrict has increased from 2019 to 2023 because Gamalama subdistrict has become the economic center for the surrounding area. Data for Gamalama Village for the last five years is presented in the following table.

Table 1.Gamalama Village Waste Volume for the Last 5 Years

	Waste Volume (m^3)	
Year	by Day	by Year
2019	415,064	151,498
2020	469,694	171. 908.096
2021	479.126	173. 908.096
2022	485,789	177. 798,591
2023	514,834	187. 914.319

Source: Ternate City Cleaning Service, year 2023

In 2019 the volume of waste was 151,498 m3, in 2020 it increased by 171,756,598 m3, so it became 171,908,096 m3. The rate of increase in waste volume is a condition of increasing the amount of waste every day, where in the 2019-2020 period the increase in waste volume/day averaged 54,630 m3. In 2023, the daily waste volume increased to 514,834 m3/day and 187,914,319 m3/annual. Compared with 2020, the volume of waste in 2023 will increase to 187,762,821 m3. Based on this increase, for 3 years (187,762,821/3=62,587,607), it can be predicted that the volume of waste each year will increase by approximately 62,587,607 m3.

The Ternate City Government has an institution that has full authority and responsibility in dealing with problems related to the environment, such as rubbish, wastewater, greening, and city parks, namely the Ternate City Cleaning Service. The task is to carry out cleanliness management. Meanwhile, its function is to plan, monitor cleaning, and transport waste.

The main task of the cleaning section is to supervise and manage rubbish cleaning, including collecting, utilizing, and destroying rubbish. Meanwhile, the main task of the transportation section is to transport waste from temporary waste storage sites (TWSS) to final waste disposal sites (FWDS).

To determine public perceptions regarding waste management in Gamalama Village, Central Ternate City, this research used a questionnaire as a data collection instrument. Questionnaires were distributed to the entire sample of 95 families. The characteristics of respondents' answers to each question item are presented in the following table.

Table 2. Respondents' Answers about the State of the Waste

Answer Characteristics	Category	Amount	%
Very clean	Positive	10	10.52
Clean	Positive	14	14.73
Not clean enough	Negative	40	42.10
Very dirty	Negative	31	32.63
Amount		95	100

Source: Research Process, 2023

Based on the table above, only 24 respondents answered that the environment was clean, while the remaining 71 respondents answered that the environment was not clean. This answer indicates that waste management in the Gamalama Village environment is still a social problem. This is reinforced by the responses of respondents who still feel disturbed and uncomfortable about the condition of the waste as shown in Table 3 below.

Table 3. Respondents' answers about the smell of garbage

Answer Characteristics	Category	Amount	%
Do not disturb	Positive	11	11.57
Bother	Negative	13	13.68
Sometimes annoying	Neutral	40	42.10
Very annoying	Negative	31	32.63
Amount		95	100

Source: Research Process, 2023

The table above shows that around 71 respondents answered negatively while the remaining 24 did not feel disturbed. This shows that the dominant condition of waste in Gamalama sub-district is still troubling residents. This phenomenon is caused by a lack of public awareness of behavior that is clean from rubbish, especially the order in disposing of rubbish at Temporary Waste Disposal Sites (TWDS).

***Figure 1**. Improper Waste Disposal*

The TWDS in Gamalama sub-district is still very limited so the waste stored in the TWDS exceeds capacity and is scattered around the tanks. This is by the respondents' answers in Table 4 below.

Table 4. Respondents' answers regarding Temporary Waste Disposal Site (TWDS)

Answer Characteristics	Category	Amount	%
Have been enough	Positive	30	31.57
Enough	Positive	44	46.31
Not enough	Negative	12	12.63
Not Very Enough	Negative	9	9.47
Amount		95	9.47

Source: Research Processed, 2023

Table 4 shows that around 74 respondents stated that the temporary waste disposal site was sufficient to serve residents' waste, while the remaining 21 respondents stated that it was not enough.

This shows that public awareness of using TWDS is not appropriate so it eliminates the aesthetics of the environment and also creates a bad smell and can cause disease transmission. In this case, the waste management system can be categorized as good, but not all people behave well and orderly in treating waste. This is recognized by the public, the majority of whom state that waste management is good, as shown in Table 5 below.

Table 5. Respondents' answers regarding the waste management system.

Answer Characteristics	Category	Amount	%
Very Good	Positive	39	41.05
Good	Positive	20	21.05
Bad	Negative	15	15.78
Very Bad	Negative	21	22.10
Amount		95	100

Source: Research Process, 2023

Table 5 above shows that 59 respondents stated that waste management was good, such as providing TWDS and waste pickup hours. However, it cannot be denied that a weakness that must be corrected is the habit of late transportation so that in the morning, rubbish can still be seen on the sides of the road.

Moreover, public awareness of throwing rubbish carelessly or out of place, on the roads, and in public places disturbs the aesthetic beauty of the environment. In this case, both the community and city cleaning officers have not been orderly in managing waste. This can be seen in Table 6 below.

Table 6. Respondents' answers regarding orderliness in disposing of rubbish

Answer Characteristics	Category	Amount	%
Orderly	Positive	13	15.78
Sometimes	Positive	45	41.05
Undisciplined	Negative	37	43.17
Amount		95	100

Source: Research Process, 2023

Table 6 shows that the level of orderliness of both the public and waste management cleaning staff is still low. There were 37 respondents' answers in the negative

category. This means that according to the community, waste management has not been orderly according to the community expectations. Meanwhile, 45 respondents stated that sometimes, which also means disorderly.

There are inconsistencies between the behaviors of some communities in waste management, very inconsistent with their perceptions, where the community already has a good perception of cleanliness. This is proven in the respondents' answers as shown in Table 7 below.

Table 7. Respondents' answers regarding waste that is not managed properly

Answer Characteristics	Category	Amount	%
Very Impactful	Positive	45	47.36
Impactful	Positive	50	52.63
No Impact	Negative	-	
Very Unimpactful	Negative	-	
Amount		95	100

Source: Research Process, 2023.

Based on the table above, the Gamalama community shows quite a high awareness of the dangers of waste, where all respondents (100%) stated that waste that is not managed properly will have an impact on health problems (disease transmission). This awareness is a great strength and opportunity for efforts to implement clean and anti-waste living in the sub-district.

This kind of high public awareness makes it easier to promote cleanliness and good waste management. However, the question arises as to why the conditions in Gamalama sub-district still look so contrasting. The sub-district environment is not clean but is still categorized as being littered with rubbish. The community recognizes this, as shown in Table 8 below.

Table 8. Respondents' answers regarding cleanliness in Gamalama Village

Answer Characteristics	Category	Amount	%
Very Good	Positive	20	21.05
Good	Positive	10	10.52
Bad	Negative	36	37.89
Very Bad	Negative	29	30.52
Amount		95	100

Source: Research Process, 2023

The table above shows the characteristics of respondents' answers, where 36 respondents, or 37.89% gave bad answers and 29 respondents, or 30.52% gave very bad answers. This shows that the majority of respondents stated that the Gamalama area had not been properly cleaned from rubbish.

The Gamalama community has a very large volume of waste, this is because most of the community is engaged in the home industry, and specifically in the market area are the traders. The volume of waste at the TWDS is influenced by the frequency or quantity of waste produced by the community itself.

Table 9. Characteristics of Respondents' Answers about Frequently Throwing out Trash

Answer Characteristics	Category	Amount	%
Every Day	Very Often	50	52.63
Once Every 2 Days	Often	20	21.05
Once Every 3 Days	Seldom	15	15.78
Every Week	Rarely	10	10.52
Amount		95	100

Source: Research Process, 2023

Based on the table above, the residents of Gamalama Village have rubbish that is regularly thrown away every day, around 70% of respondents often throw rubbish every day. Based on the level of population density which also drives the volume of waste to accumulate every day, this result in waste generation exceeding capacity and not being by the available TWDS. This must be followed by an increase in the number of TWDS.

2. Waste Management Model

To identify the appropriate waste management model, it is necessary to first analyze several things that are of concern in this research, namely the waste management system, characteristics of waste disposal sites, and community participation.

a. Waste Management System

The first operational stage of waste management is containerization at the generation source (community) level. Containers are intended to prevent waste from being scattered and make the collection process easier. The stage of storing and transporting waste from the source to the temporary waste disposal site (TWDS) is a joint responsibility between the waste source and the local government. This is by the principles of sustainable waste management which emphasizes joint responsibility between waste generators and the government.

This is following interviews with informants that "Everyone is responsible for taking waste to the temporary waste disposal site (TWDS). People use the services of movers and motorbike taxis in addition to dumping themselves to move their waste from their homes to the TWDS. The containers had various types and shapes, including trash cans, permanent tubs, and sacks." Based on observations, it is known that containerization is generally carried out without separating the types of waste into organic and inorganic. According to informant Suratman, before throwing them away, people usually set aside used goods to sell or hand them over to the used goods collectors.

Regading the rubbish services for pedestrians, the Government has tried to provide separate rubbish containers at the edges of the road for pedestrians. However, the lack of education for pedestrians means they still mix organic and inorganic waste. The next stage after containerization is the collection stage. The waste collection stage from the source in Ternate City, especially in Gamalama Village, to the final waste disposal site (TWDA) is carried out using a dump truck.

The waste collecting operations in a service area are a combination of the above patterns, according to the waste source. The TWDS system is the most widely used today. However, its operation is not easy, because it requires waste collection facilities and relatively more labor. According to the MA informant, currently, the recommended system is the ball pick-up pattern because it is easy, cheap, and fast to operate. However, this system requires cooperation from officers and the public to comply with the established waste collection hours. Garbage pickup time from the TWDS to the FWDS is every 06.00 a.m. In the afternoon, waste collection was carried out at TWDS which is full of piles of rubbish.

b. Waste Disposal Site Characteristics

The following describes the characteristics of the waste transfer facilities in Ternate City:

1) Temporary Waste Disposal Site (TWDS), namely a container constructed of brick without a roof equipped with a door hole with or without a door. Average size 3 m^3. It is placed close to the source of the waste. The use of TWDS is generally not preferred due to environmental, aesthetic, and operational reasons that are impractical (it takes a relatively long time and requires a lot of energy).

Figure 2. Concrete trash can

2) Container, namely a tub with iron or steel construction with a door and ventilation, with a volume of 6m^3. The characteristics of containers are suitable for use in large waste sources, can be placed in many places, and can be moved. It requires a large space for placement, and the process of moving and transporting is easy and fast.

Figure 3. Temporary Waste Storage Container (TWDS)

In practice, this facility has not been utilized optimally. According to informant Ahmad Yusup, some people throw rubbish into storage containers while not doing it properly. Just throw it away without paying attention to whether the trash goes into the container correctly or not. For them, the most important thing is that the waste has arrived in the container. Transferring rubbish from carts is still carried out in an untidy manner, with many people unloading rubbish outside the bin, resulting in the container location becoming dirty and unhealthy. This can be seen in the image below

Figure 4. Condition of Garbage at TWDS

3) Square Barrels. This is a small waste container provided for pedestrians on the side of the road or vehicles crossing the road. These containers have been provided on the sides of the road in categories of wet waste and dry waste for people to dispose of waste in appropriate places.

Figure 5. Trash collection bin

The success of waste management can be measured by the effectiveness and efficiency of waste transportation from the

source to the landfill. Transportation should not be delayed because this will increase the burden of subsequent transportation and risk disrupting to the comfort of the environment around the storage area. This stage is special because a large portion of costs, time, energy, and coordination are required. Evaluation and planning of types of facilities, operating schedules, and transportation routes are important things in transportation.

The type of waste transportation facility used in Ternate City is Dump Truck. This vehicle is a modification of a regular dump truck. The dump truck body can be moved hydraulically so that the garbage unloading process can be effective, while the operational time is the same as a regular dump truck. The body is made of steel with a capacity of 8m3.

c. Community participation

Community participation in waste management in Gamalama Village in terms of payment of fees is quite good. However, participation in terms of involvement in technical operational waste management is still very lacking. According to informant, Ali Hasan, the community is never late about the payment of levies, everything runs smoothly, but the problem is the delay in throwing out the trash in the morning. According to the informant, residents' lack of discipline in obeying waste disposal hours resulted in piles of rubbish at the TWDS still being visible in the morning. Barriers to implementing community participation can be grouped into two, namely internal barriers and external barriers.

The obstacle from within society is whether the community wants to be involved and knows what their desires are. Then, it also depends on the conditions and characteristics of the community itself, for example, the economic level, education level, and elements of trust.

Obstacles from outside society mainly arise because there is no good cooperation between the government and the community. Community levies on waste management operational costs as regulated in Regional Regulation Number 13 of 2008 concerning Waste and Cleaning Services Levy, Article 7 regulates the principles and provisions of retribution fees, namely: (a) The principles and targets in determining the structure and amount of retribution rates are intended to cover service delivery with consideration of community capacity and aspects of justice; (b) The costs as intended in paragraph (1) include the costs of collecting, transporting, and managing waste and/or destroying waste as well as the costs of maintaining and providing waste service facilities. The amount of levies for each category is explained in Article 8, namely:

No	Category	The Amount of the Levy
1	Household	Rp. 2.500 / Month
2	Educational Institution Facilities	Rp. 25.500 / Month
3	Office	Rp. 25.500 / Month
4	Business Entity :	
	a. BUMN/BUMD	Rp. 50.000 / Month
	b. Privately Owned Enterprise	Rp. 50.000 / Month
5	Industry:	
	a. Large Industry	Rp. 100.000 / Month

No	Category	The Amount of the Levy
	b. Medium Industry	Rp. 50.000 / Month
	c. Small Industry	Rp. 25.000 / Month
6	Health Facilities :	
	a. Hospital	Rp. 250.000 / Month
	b. Doctor's Work Practice Place	Rp. 25.000 / Month
	c. Puskesmas/Maternity Home	Rp. 75.000 / Month
7	Trading Facilities :	
	a. Market / Settlement	
	– Permanent trader, Large Kiosk	Rp. 50.000 / Month
	– Permanent trader, Medium Kiosk	Rp. 45.000 / Month
	– Traders without Kiosks/Street Vendors	Rp. 15.000 / Month
	b. Shop	
	– Big Shop	Rp. 150.000 / Month
	– Medium Shop	Rp. 50.000 / Month
	– Small Shop	Rp. 25.000 / Month
	c. Food and Drink Facilities :	
	– Large Restaurant, Restaurant	Rp. 50.000 / Month
	– Medium Restaurant, Cafe	Rp. 50.000 / Month
	– Small Restaurant/ Tavern	Rp. 25.000 / Month
	d. Accommodation Facilities (Hotels and Inns)	
	– Star III	Rp. 50.000 / Month
	– Star II	Rp. 40.000 / Month
	– Star I	Rp. 30.000 / Month
	– Melati III	Rp. 30.000 / Month
	– Melati II	Rp. 25.000 / Month
	– Melati I	Rp. 20.000 / Month
	– Boarding House	Rp. 20.000 / Month
8	Entertainment and Sports Facilities:	
	a. Discotheque	Rp. 50.000 / Month
	b. Karaoke	Rp. 25.000 / Month
	c. Cinema Building	Rp. 50.000 / Month
	d. Multipurpose Building	Rp. 10.000 / Month
	e. Sports Facilities/ Tourist Attractions	Rp. 25.000 / Month
9	Self-Use of TPA	Rp. 100.000 / Month
10	Processing and/or destroying waste at TPA	Rp. 25.000 / Month /M^3
	Special Service	Rp. 25.000 / Month /M^3

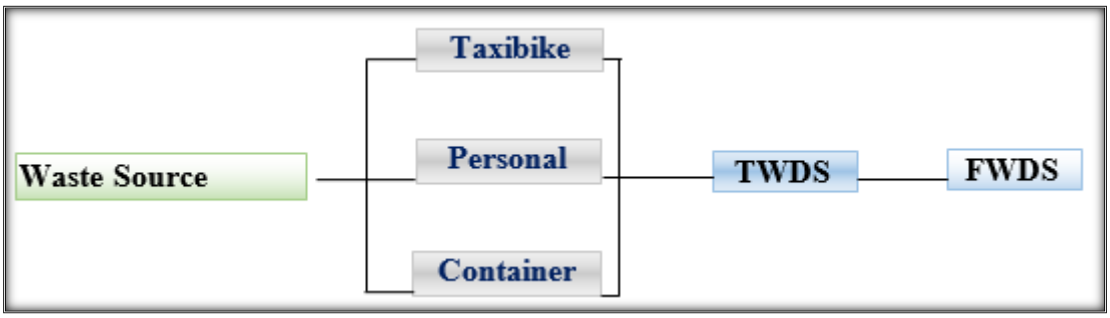

Figure 6. Waste Management Model

Based on the description above, it can be interpreted that the waste management system in Gamalama subdistrict, Central Ternate City still uses the old model, namely the end-pipe of solution as shown in Figure 1 below.

This model causes ineffective waste management in the Gamalama sub-district. Garbage collected in TWDS and delays in waste collection officers at TWDS can spread foul odors, thereby polluting environmental conditions and disturbing the community. (Responses from the people of Gamalama sub-district showing concern about waste are described in section 2). Furthermore, the volume of waste at the landfill has increased because there is no waste processing process at the upstream level.

This waste management model is no longer relevant because Law Number 18 of 2008 concerning waste management and Government Regulation Number 81 of 2012 mandate the need for a fundamental paradigm change in waste management. The new paradigm is reducing the volume of waste, not just throwing it away, but how to recycle it so some of the waste can become goods for economic value. As stated by Syafrudin (2004), waste management can be done from the upstream (source) by reducing waste products that will be sent to the final processing site. This can be realized through the Reduce, Reuse, Recycle model (Syafruddin, 2004:1).

Using this model can inspire residents to use waste to increase their income while improving the quality of their environment (Rapii et al., 2021). The "Community Empowerment" model is also suitable for waste management in the Gamalama sub-district (Pratama et al., 2021).

CONCLUSION

Gamalama Village has become an economic center which automatically increases the volume of community waste from year to year. The volume of waste in Gamalama sub-district increased to 514,834 m3/day and 187,914,319 m3/year. This increase is very significant when compared to the volume of waste in the previous year (2022) of around 485,789 m3/day and 177. 798,591 m3/Year.

The waste management model still uses the old model, namely a pick-up and drop-off pattern where the source of the waste or the community brings the waste to the TWDS, then from the TWDS, the cleaning staff transfers it to the FWDS. This poses a risk for waste accumulation because field officers are often late in picking up waste. Moreover, people are also less orderly in disposing of rubbish, resulting in lots of rubbish piled up on the sides of the road which not only disturbs the aesthetics of the environment but can also threaten public health.

This is very disturbing to the community, so people have a negative perception of waste management in the Gamalama sub-district. To overcome the waste problem in Gamalama sub-district, it is recommended that waste management should be based on community empowerment by implementing the 3R model (reduce, reuse, and recycle) so waste can be processed into useful and economically valuable goods and the waste can be handled from upstream to downstream.

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