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Source Based Waste Management at the Environment Department of Buleleng Regency

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Abstract

This study aims to determine the management of waste management organized by the Buleleng Regency Environmental Service and to explore information related to problems that occur in the implementation of waste management, especially source-based waste management organized by the Buleleng Regency Environmental Service. This study uses descriptive qualitative analysis as a research methodology. The data collected was obtained through observation of documents and reports, in-depth interviews, focus group discussions. Observation of data and reports, in-depth interviews and focus group discussions were conducted to obtain data related to waste management at the Buleleng Regency Environmental Service with sources namely officials Structural and Environmental Extension Officer at the Buleleng Regency Environmental Service. The results showed that the general waste management and source-based waste management organized by the Buleleng Regency Environmental Service were not optimal, both in terms of waste reduction and handling activities. The researcher found that from the waste balance report compiled every semester from 2019 to 2021, there was a gap between the achievements and the targets set in the Strategic Policy for the Management of Household Waste and Waste Similar to Household Waste (Jakstrada). Waste management activities are more focused on waste handling

Keywords
Waste management; waste reduction; waste report

I. Introduction

Garbage is the residue of human daily activities and/or from natural processes in solid form which can cause and or result in contamination of water, soil and air so that it can cause damage to the human environment. In addition to having an impact on environmental damage, the presence of large amounts of waste if not managed properly will cause various problems, such as environmental, health, socio-economic and cultural conditions in the community. Settlements that each person will produce 2.5 liters of waste/person/day or 0.5 kg/person/day, so that the increasing population of an area, it is certain that the production of waste generation will also increase. Organization must have a goal to be achieved by the organizational members (Niati et al., 2021). The success of leadership is partly determined by the ability of leaders to develop their organizational culture. (Arif, 2019).

The number of residents and households will greatly determine the volume of waste generated. Waste management and transportation is a separate problem that is still difficult to overcome. If it is not handled properly it will cause a pile of garbage, so that in the end it will cause a dirty and polluted environment.

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Buleleng Regency, which is located in the northern part of Bali Island, has an area of 1,365.88 km2 consisting of 9 sub-districts, 129 villages, 19 sub-districts, with a population in 2020 (Central Statistics Agency) is 687,200 people. Based on the population, waste management in Buleleng Regency is in the category of lower-middle city waste management (according to Jakstranas) so that the potential for waste generation per capita in Buleleng Regency refers to 0.5 kg/person/day plus 20% waste from public facilities is 413.32 tons/day. Days or 148,795.2 Tons/year. This amount will cause problems if the waste cannot be managed properly and/or only transfers the source of the problem from households to the Final Processing Site (TPA).

Currently, the handling of waste in Buleleng Regency in accordance with the provisions is still being pursued so that it can be carried out optimally, so that waste handling with the old paradigm, collection, transport, and disposal can be replaced with source-based waste management, so that the volume of waste that enters the landfill is only type of waste. residual waste. Currently, the volume of waste entering the Bengkala TPA reaches an average of 52,603.65 tons/year (Buleleng Regency Environmental Service Data 2020) or as much as 35.35% of the Buleleng Regency 2020 potential waste generation. The final disposal of waste in Buleleng Regency, was originally a single solution provided by the local government together with the central government to process and process residual waste safely back to nature, namely through the management of sanitary landfills and/or controlled landfills. The TPA has been functioning by the Buleleng Regency Government since 2004 until now. Currently the Bengkala TPA is facing the problem of the limited area of the waste storage cells, so it is necessary to immediately implement a planned and gradual solution.

The design of the TPA was initially to serve waste generation of 100 tons/day with a semi-aerobic landfill system for waste disposal, with a total population of 538,680 people with service areas covering 9 sub-districts in Buleleng Regency. The incoming waste generation was estimated at that time at 373-400 m3/day or equivalent to 79.82 - 85.60 tons/day, with an estimated economic life of ± 8 years. Meanwhile, data sources at the Buleleng Regency Environmental Service in 2020 noted that the amount of waste entering the Bengkala TPA reached 144,119 tons/day. From this fact, it can be seen that the volume of waste entering the TPA every day is much higher than the initial estimate of the volume of waste during the design of the Bengkala TPA.

The total waste that entered the TPA from 2007 to 2019 or over a period of 12 years was 562,338.12 m3 or 120,340,36 tons. Garbage that enters the Bengkala TPA is transported by a total of 97 waste transport fleets, consisting of 27 units of 6-wheeled trucks and 3 units of 4-wheeled vehicles belonging to the Buleleng Regency Government and 67 units of rural waste service fleets. These units go to the TPA and dispose of their waste 2-3 times per day.

Under these conditions, waste is piled up in places that are not supposed to be due to the limited number of waste disposal cells that meet the technical requirements for TPA management. The high pile of garbage causes the geomembrane layer and methane gas release pipe to be ineffective in controlling leachate infiltration into the ground and the general release of methane gas into the air. This is accompanied by several times the landfill has experienced fires. So that good management and strategies are needed in order to be able to manage waste more effectively and efficiently.

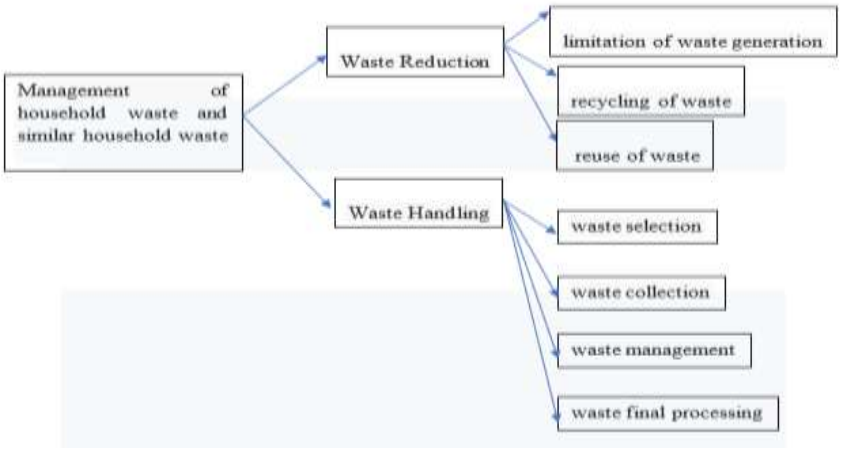
II. Resview of Literature

2.1 Management concept

Terry (2009: 1) gives the notion that management is a process or framework, which involves the guidance or direction of a group of people towards organizational goals or real purposes. This includes knowing what to do, determining how to do it, understanding how they should do it and measuring the effectiveness of the efforts that have been made. Management is defined as a process because all managers, regardless of their particular skills or abilities, must carry out certain interrelated activities to achieve their desired goals. The process consists of management activities, namely: planning (planning), organizing (organizing), actuating (implementation) and Controlling (supervision).

2.2 Waste Management System

Waste management is a systematic, comprehensive and sustainable activity that includes waste reduction and handling (Law Number 18 of 2008) concerning Waste Management. So far, most of our society still considers waste as useless leftovers, not as a resource that needs to be utilized. The paradigm of waste as a resource that has economic value and can be utilized, for example for energy, compost or for fertilizer (Principles of Waste Management, www.google.com, 2010) Waste management with the new paradigm is carried out with waste reduction and handling activities as in following image.



(Source: Principles of waste management module, 2010)
Figure 1. *Waste Management Scheme*

Waste reduction activities are generally carried out in a community setting which includes:
- Limitation of waste generation
- Garbage recycler
- Waste reuse

Meanwhile, waste management includes:
- Garbage sorting
- Garbage collection
- Garbage transport
- Waste processing
- Final processing

2.3 Previous research

Based on this research, the author first explores several studies conducted by (Gita Monica Ponomban et al (2019) who raised a study entitled Household Waste Management Management in Kinali Village, Kawangkoan District, found that in the implementation of household waste management planning there are still some people have not followed the procedures prepared by the government, so that some people are still indifferent in maintaining environmental cleanliness. In organizing the data, it is obtained that the data has not fully gone well because there are some people who have not followed the organization that the Kinali government has implemented. In the Implementation of Management there are still some people who do not really understand the procedures that the government applies to Kelurahan Kinali. While in the control phase, the government has provided guidance to the community to maintain environmental cleanliness and also not to dispose of garbage. carelessly.

The second study by (Parluhutan Solomon, Joyce Rares, Very Londa, 2021) conducted research on Bantargebang Waste Management in Bekasi City. The focus of the research is to find out the management of Bantargebang waste in Bekasi City which uses the management function according to (Terry, 2009).

- Planning, that the Jakarta Provincial Environment Agency will implement the Jakarta Collaborative program, namely the Samtana program;
- Organizing, there is a division of tasks for the division to manage waste to manage waste and there is cooperation from various parties to contribute to the Bantargebang TPST;
- Implementation, the Jakarta Provincial Environment Agency organizes the DKI Jakarta program, organizes training programs and provides supporting work tools;
- Supervision, carrying out monitoring activities.

III. Research Method

This study uses qualitative research methods, namely research methods based on the philosophy of postpositiveism used or interpretive, used to examine the condition of natural objects, where the researcher is the key instrument (Sugiyono, 2017). The location of this research is the Environmental Service of Buleleng Regency, Bali Province. The subjects of this study involved Structural Officers, Associate Functional Experts, Environmental Extension Officers and TPS3R Managers. Data collection techniques used are documentation studies, interviews and Focus Group Discussions (FGD).

IV. Result and Discussion

4.1 Waste Management Management by the Buleleng Regency Environmental Service

Population growth and changes in people's consumption patterns cause an increase in the volume, types and characteristics of increasingly diverse waste (Law No. 18 of 2008). Buleleng Regency, which is located in the northern part of Bali Island, has an area of 1,365.88 km2 consisting of 9 sub-districts, 129 villages, 19 sub-districts, with a population in 2020 (Central Statistics Agency) is 687,200 people. Based on the population, waste management in Buleleng Regency is in the category of lower-middle city waste management (according to Jakstranas) so that the potential for waste generation per capita

in Buleleng Regency refers to 0.5 kg/person/day plus 20% waste from public facilities is 413.32 tons/day. Days or 148,795.2 Tons/year.

This amount will cause problems if the waste cannot be managed properly and/or only transfers the source of the problem from households to the Final Processing Site (TPA).

In an effort to reduce waste in Buleleng Regency, the Environmental Service is trying to develop waste management management in accordance with the provisions of the legislation, namely Law Number 18 of 2008 concerning Waste Management which includes waste handling and reduction activities.

4.2 Planning

In the planning stage of waste management carried out by the Buleleng Regency Environmental Service, it refers to the Buleleng Regent Regulation Number 1 of 2019 concerning the Management of Household Waste and Types of Household Waste, known as the Jakstrada document which contains waste reduction and handling targets.

Table 1. Waste Management Target

Description	Waste Management Targets in the JA KS TRADA Document						
	2019	2020	2021	2022	2023	2024	2025
1	2	3	4	5	6	7	8
the target of reducing household waste and similar household waste at the Buleleng district level	30.404.02	34.133.32	37.958.82	41.944.49	44.428.90	46.996.90	51.359.81
the target of reducing household waste and household-like waste in the Jakstrada	20%	22%	24%	26%	27%	28%	30%
target for handling household waste and household waste at the Buleleng district level	121.616.11	116.295.40	117.039.70	117.767.24	118.477.07	119.168.19	119.839.56
target for handling household waste and similar household waste in Jakstrada	80%	75%	74%	75%	72%	71%	70%

4.3 Organizing

The Buleleng Regency Environmental Service is a Regional Apparatus Work Unit whose institutions are formed based on:

1. Buleleng Regency Regional Regulation Number 10 of 2021 concerning the second Amendment to Regional Regulation 13 of 2016 concerning the Establishment and Structure of the Buleleng Regency Regional Apparatus;
2. Buleleng Regent Regulation Number 52 of 2021 Concerning the Establishment, Position, Organizational Structure, Duties, and Functions and Work Procedures of Regional Offices

Its main task is to carry out the authority of regional autonomy in the environmental sector. To carry out this task, the Buleleng Regency Environmental Service carries out the following functions:

- Carry out regional autonomy authority in the environmental field;
- Organizing affairs in the environmental field;
- Formulation of policies in the environmental sector;
- Implementation of environmental protection and management;
- Guidance of UPTD and management of official administration

For matters of waste and waste management, it is the duty and function of the Waste and B3 Waste Management Sector.

a. draw up an activity plan for the Waste and B3 Waste Management Sector based on the data and programs of the Environmental Service and the provisions of the legislation;
b. lead and distribute tasks to subordinates
c. evaluate and assess the performance of the work of subordinates;
d. facilitate the implementation of waste reduction and waste management as well as waste and B3 management;
e. facilitate and coordinate the preparation of data and information on waste reduction, waste handling, waste management and B3;
f. facilitate and coordinate the proposed cooperation in waste management, waste management and B3 with agencies, private institutions and NGOs in other districts/cities in partnership with business entities;
g. facilitate and coordinate the implementation of socialization, guidance and supervision of waste management, waste management and B3;
h. facilitate and coordinate the location plan and construction of 3R TPS and the establishment of a Waste Bank;
i. facilitate and coordinate the implementation of verification of technical materials and monitoring of TPS LB3, TPS, TPS 3R and LHC in waste management, waste management and B3;
j. facilitate and coordinate the implementation of technical materials on waste management, waste management and B3;
k. facilitate and coordinate the provision of facilities and infrastructure for waste management, waste management and B3;
l. evaluate and report the results of program implementation performance to superiors;
m. To assist the official duties in the field, especially as the spearhead of implementing affairs in the field of cleanliness and solid waste, the Buleleng Regency Environmental Service is assisted by Freelance Daily Workers (THL). The division of tasks and work areas is carried out by the Office through the Waste and Hazardous Waste Management Sector (PSLB3).

Table 2.

Task	amount	daily wage	description
Mentor Of Cleanliness	20	55.000.00	THL working time is 4 hours/day
Sweeper Power	344	40.000.00	
Beach Cleaner	33	40.000.00	
River Cleaner	32	40.000.00	
Lake Cleaner	17	42.000.00	
Armroll Truck Driver	20	75.000.00	
Dump Truck Driver	41	60.000.00	
Watering Tank Driver	6	75.000.00	
Trimmer Truck Driver	2	75.000.00	
Trimmer	4	50.000.00	
USB Vehicle Driver, Tricycle Power, Garbage Truck Driver, Landfill Truck Driver	246	45.000.00	

4.4 Actuating

At the implementation stage, waste handling activities are adjusted to the mandate of Law Number 18 of 2008 concerning Waste Management, the Buleleng Regency Government makes a division of tasks and assigns Freelance Daily Workers (THL) to carry out functions according to the stages of handling waste, namely, sorting, collecting, transporting , processing and final processing of waste at TPA Bengkala.

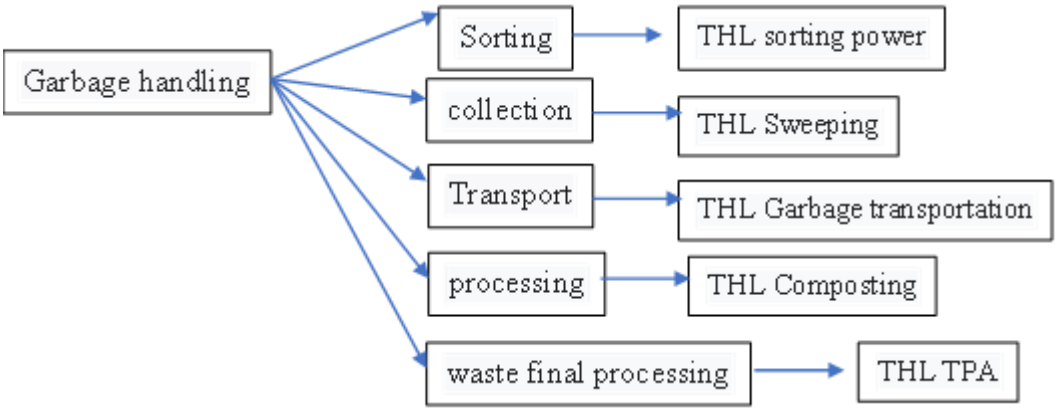


Figure 2. *Division of tasks for freelance daily workers (THL)*

Waste sorting activities are carried out at the transfer depot location, namely a temporary collection point for waste originating from waste collection carried out by THL sweeping, and garbage originating from the surrounding community. Sorting workers will separate waste that still has economic value, to be sold to waste banks or collectors, while organic waste will be transported by waste transporters to the Jagaraga composting plant center to be processed into compost, while waste taken directly from the LHC will be taken to a processing site. The final waste is at the Bengkala TPA.

4.5 Controlling

For the evaluation stage of the achievement of waste management performance, the Buleleng Regency Environmental Service records activities, both in reducing and handling waste. Poured into the waste balance report which will be evaluated every semester. Supervision of personnel in the field is also carried out properly, starting from field supervisory personnel who monitor the performance of the team commander, and each danru is responsible for personnel who are members of his work.

Table 3. Waste Management Targets and Achievements

description	2019		2020		2021	
	target	achievements	target	achievements	target	achievements
amount of waste generation	152,020.14	122.337.78	155.060.54	124.791.86	158.161.75	125.414.00
waste reduction amount	30.404.02	7.574.85	34.133.32	10.397.65	37.958.82	25.480.40
waste reduction percentage	20.00	6.19	22.00	8.33	24.00	20.32
amount of waste handling	121.616.11	52.846.93	116.295.40	53.098.88	117.039.70	54.326.23
percentage of waste handling	80.00	43.2	75.00	42.55	74.00	43.32
managed waste (II+III)	152.020.13	60.421.78	150.428.72	63.496.53	154.998.52	79.806.63
unmanaged waste (I-IV)	0.01	61.916.00	4.631.82	61.295.33	3.163.23	45.607.37

The chart of targets and achievements of waste management in the Jakstrada of Buleleng Regency is as follows:

Waste management achievements

Figure 4. *Waste Management Targets and Achievements*

- The amount of waste generation from year to year tends to increase; however
- The achievement of waste management performance through waste reduction and handling activities, has not run optimally
- the volume of unmanaged waste is still high.

The report data on the performance of waste management performance presented in table and diagram above are in accordance with the results of interviews with informants, that waste management organized by the Buleleng Regency Environmental Service has not run optimally.

From the Focus Group Discussion, the researcher received an explanation from the resource persons, that the achievement of waste management in Buleleng Regency was not optimal, because it was caused by several factors, including:

a. Limited supporting facilities and infrastructure in waste services;
b. Limited budget support;
c. The availability of human resources, especially field personnel, which are still limited in number compared to the service area;
d. The synergy between the government and the community has not been built and developed properly;
e. The use of technology and innovation in waste management is still limited.

5. Source-Based Waste Management

Source-based waste management carried out in a community setting is one of the waste reduction activities at the nearest source of waste generation. The main key is community participation and the existence of environmental-friendly institutions and organizations located in the community. This organization can be in the form of a Waste Bank Unit and KSM which manages waste at TPS3R. The activities carried out start from sorting to the stage of processing waste into products that have economic value.

The data on the TPS3R waste management organization and the Compost House located in the village as well as the volume of waste managed through source-based waste management activities carried out in the villages are part of the organization assisted by the Buleleng Regency Environmental Service in source-based waste management (appendix). The data in the appendix shows:

Table 4. Number of waste management organizations and regulations

organization	amount	active	not active	active organization
1	2	3	4	5
TPS3R	32	24	8	75.00%
compost house	11	5	6	45.45%
trash bank	134	78	56	58.21%
village regulations on waste management	9			
prebekel regulations on waste management	7			
perarem	18			

The data in table 4 shows that out of a total of 177 source-based waste management organizations located in villages, the organizations/institutions that show active management have only reached 107 units (60.45%). While the remaining 39.55 are in an inactive condition, mostly because there is no sorting power.

This is in accordance with the information from the informants, that outreach activities are an important step that must be continuously improved to provide education to the public, that waste if managed properly will bring in rupiah value.

In addition to strengthening institutions, campaigns for drafting village regulations and prerem regarding source-based waste management must continue to be conveyed to the village government, so that villages have clear guidelines regarding waste management, targets, policies and strategies that will be taken by the village government in completing waste management in the village. each village.

Table 5 below presents data on source-based waste management carried out at TPS3R and Kompos Houses.

Table 5. Achievements of source-based waste management

type of trash	amount of incoming waste(tons)/day	amount of waste managed (tonnes/day)			compost production (tonnes/month)
		organic	Non	residue	

			organic		
TPS3R	87.45	45.9	0.364	45.88	1071.20
compost house	21.78	7.26	0.065	14.52	2800.00
amount	109.23	53.16	0.429	60.4	3871.20

V. Conclusion

The above data was obtained from reports of each TPS3R and Compost House which were submitted to the Buleleng Regency Environmental Service. This data will be submitted to the Regional Leadership through a waste balance report which is prepared every semester. This waste management data is submitted by TPS3R which is actively operating or about 60.45%, while the rest are in an inactive condition so they do not report waste management data.

Due to this condition, the Buleleng Regency Government through the Buleleng Regency Environmental Service has taken steps to optimize source-based waste management held in Buleleng Regency, these steps are also to answer the third problem formulation. In this case, the researchers also increased the number of resource persons by involving environmental educators. From the discussion results obtained information that the strategy that needs to be carried out for optimizing source-based waste management that must be immediately implemented by the Buleleng Regency Environmental Service is

a. Prioritizing additional improvements to the waste management infrastructure;
b. Looking for alternative financing outside the Regional Revenue and Expenditure Budget (APBD)
c. Cadreization of Human Resources engaged in the environmental field
d. Increasing the participation of the community and the private sector in waste management
e. Carry out innovations in waste management

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