Journal of Social Research

P-ISSN: 2827-9832
E-ISSN: 2828-335x
http://ijsr.internationaljournallabs.com/index.php/ijsr

STRATEGIES FOR IMPROVING THE PERFORMANCE OF SUSTAINABLE DOMESTIC WASTEWATER TREATMENT PLANTS

Imtiyaz Olaf Jatmy, Katharina Oginawati
Faculty of Civil and Environmental Engineering, Bandung Institute of Technology
imtiyazolafjatmy@gmail.com

ABSTRACT

The West Java Provincial Government has inaugurated a community-based sanitation program in 18 Bandung Regencies. Especially in the Citarum watershed, domestic waste contributes 68% to river pollution and has water quality status over the past 10 years, showing 54% heavily polluted, 23% moderately polluted, 20% lightly polluted and only 3% meeting quality standards. Efforts to improve domestic wastewater pollution control require the selection of technology that is influenced by many factors, so a theoretical and practical approach that pays attention to sustainability aspects is needed. Neglasari Village, Banjaran District, Sayati village, Margahayu District, and Cipaku village, Paseh District, are Kcamatan in Bandung Regency who have run the Sanimas program that has not met the muku standards, so it is necessary to improve the performance of the Sanimas wastewater treatment plant that is sustainable. From location of the Sanimas wastewater treatment plant spread from the upper reaches of the river, the location of the Sanimas wastewater treatment plant is in a densely populated area and sanitation-prone area, also has the need to deal with sanitation problems. This research was conducted using the SWOT method. A SWOT analysis is performed to obtain recommendations for priority strategies.

Keywords: *Wastewater Treatment Plants, Sustainability, Sanimas, SWOT*

INTRODUCTION

Indonesia's rapid population growth, especially in urban areas, has a serious impact on reducing the carrying capacity of the environment (Prihatin, 2015). These impacts must be addressed appropriately, especially in wastewater management. Domestic wastewater disposal has a very big impact on the environment, wastewater disposal without going through the treatment process will result in environmental pollution of raw water sources for drinking water, both surface water and groundwater (Yudo & Said, 2017). The achievement of access to proper sanitation in Indonesia in 2020 was 79.53% (Mayasari et al., 2022). This is harmful to the environment and public health because many people still use groundwater as a source of clean water for washing and cooking needs. River pollution in urban areas, more than 60% comes from domestic activities, among others, because the local WWTP system that dominates residential areas has not been effective in meeting effluent quality standards (Chahyadi, 2007). Domestic wastewater infrastructure, especially on a communal scale or residential scale, has been built with various treatment systems, but some have not met the quality standards of the Minister of Environment and Forestry Regulation no.68 of 2016 (Hasbiah, 2021). This can result in pollution and a decrease in the quality of the residential environment. In addition, the generation of sludge or *biosolids* from the degradation of organic matter from the WWTP has not been managed regularly, causing processing performance to decrease and safe access has not been achieved (Islam et al., 2021).

The development of the Sanimas WWTP system has begun to be carried out in stages since the enactment of the LHK effluent quality standard no.68 of 2016 and a sustainability study is needed (PANGESTU, 2021). The WWTP system, which was built before the enactment of the quality standard, requires efforts to improve performance according to variations in processing units (Standard, 2017). The West Java Provincial Government has inaugurated this Sanimas program in 18 Bandung Regencies. Neglasari Village, Banjaran District, Sayati Village, Margahayu District, and Cipaku Village, Paseh District, are Kcamatan in Bandung Regency that have run the Sanimas program. Improving the performance of domestic wastewater treatment plants with the application of additional technology is one of the efforts to manage the wastewater that has a positive impact when accompanied by the right strategy (Kusumastuti, 2008). In this study, an appropriate strategy will be defined for sustainable domestic wastewater management. Analysis of domestic wastewater performance strategies is studied based on technical aspects, economic aspects, community participation aspects, institutional aspects, and environmental aspects (Kurniawan, 2013).

HYPOTHESIS

The hypothesis of this study is that the improvement of the performance of Sanimas WWTP in Neglasari village, Banjaran District, Sayati village, Margahayu District and Cipaku village, Paseh District, is influenced by technical aspects, economic aspects, community participation aspects, institutional aspects, and environmental aspects.

DESCRIPTION OF THE STUDY AREA

The study areas in this study are Neglasari Village, Banjaran District, Sayati Village, Margahayu District, and Cipaku Village, Paseh District. The location and existing condition of the Sanimas WWTP infrastructure in Neglasari Village, Banjaran District, Sayati Village, Margahayu District, and Cipaku Village, Paseh District, are shown in Figure **1,** Figure **2,** and **Figure 3** below:

Figure 1. Building Sanimas Neglasari Village, Banjaran District

WWTP Sanimas Neglasari Village was built in 2018 and officially operated in 2019. WWTP Sanimas Neglasari Village is located in Citeureup Village, Neglasari Village, Banjaran District, Bandung Regency. The land status of WWTP Sanimas Neglasari Village is a grant from residents with an area of 45 m 2, while the building area is about 33 m^2. The distance of WWTP Sanimas Neglasari Village to the river body is as far as 5 m, while the nearest settlement is as far as 10 m. WWTP Sanimas Neglasari Village was built with state budget funds by the West Java Provincial Settlement Infrastructure Center. The handover of assets and management of WWTP Sanimas has been handed over from BPPW West Java to the village. Currently, WWTP Sanimas Neglasari Village serves 70 heads of families or 300 people. WWTP Sanimas Neglasari Village uses an anaerobic biofilter processing system with media

that its use comes from used bottle packaging. WWTP Sanimas Neglasari Village is managed by 1 active KPP manager who is in charge of maintaining WWTP, checking every tub in WWTP, cleaning up dirt that causes clogged processing units and checking the tubs around the house connection.

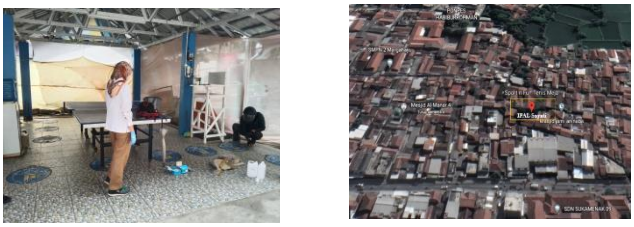

Figure 2. Building Sanimas Sayati Village, Margahayu District

WWTP Sanimas Sayati Village was built in November 2020 and began operating in 2021. WWTP S animas Sayati Village was built on grant land owned by residents and cultivated 22 heads of families. WWTP Sanimas treats *greywater* and *blackwater wastewater*. Sayati Village uses an anaerobic-aerobic biofilter treatment system. The problems that occur in WWTP Sanimas Sayati Village include social problems because there are pros and cons related to WWTP acceptance, some people do not want to install *grease traps,* there is still a lot of waste entering WWTP and there is no handover from KSM to KPP. Meanwhile, from the technical aspect, the problem with the Sayati Village WWTP is that the *outlet is* clogged and during the rainy season, the water flow from WWTP returns to WWTP because the river flow is getting faster.

Figure 3. Building Sanimas Cipaku Village, Paseh District

MCK and WWTP Sanimas Cipaku Village were built in 2016 with *anaerobic baffed reactor* technology. The number of MCK and WWTP users in Cipaku Village is 20 heads of families. WWTP Cipaku Village treats *gray* water and *black water* waste.

In the physical condition of MCK and WWTP Sanimas Cipaku Village, there is damage to pipes, ceramics, walls, and *manhole* lids. The water flow in the WWTP treatment unit also does not run lancer. The problems that occur in WWTP Cipaku Village include, there is still a lot of waste entering WWTP, the height of the mud has been more than 1/3 of the compartment, the location of WWTP is not accessible to fecal trucks, KPP needs a slurry pump and the community has difficulty paying regular dues.

Of the three okasi WWTP Sanimas is in the category range of Villages to Big Cities, so the domestic clean water needs are in the range of 60 liters/person / day-120 liters/person per day. The use of clean water for the three WWTP Sanimas that are surveyed is in the range of 60 liters/person/day - 120 liters/person/day.

SANIMAS WWTP PERFORMANCE

Based on the results of survei kethree WWTP Sanimas from upstream river **Table 1.** describes the system and performance of the processing plant applied to WWTP Sanimas.

Table 1. Sanimas WWTP Performance

No	Parameters	Existing Conditions		
		Neglasari Village	**Sayati Village**	**Cipaku Village**
1	Types of processing systems	Anaerobic Biofilter	Biofilter Anaerobic - Aerobic	Anaerobic Baffled Reactor
2	The volume of processing units	90 m^3	50 m^3	60 m^3
3	Organic load (kg BOD 5/m^3 day)	6,2	16,8	19,73
4	Detention time (Clock)	32	2	8

Source: Balai Prasarana Permukiman Daerah Jawa Barat, 2020

QUALITY OF EFFLUENT AND INFLUEN WWTP SANIMAS

The results of laboratory tests shows that in Neglasari village, the BOD value is higher than the COD value. In theory, Samudro Ganjar, 2010 stated that the BOD/COD ratio should be equal to or less than 1.0. According to Nur Fauzia Dinny, 2021 is indicated that one of the causes of inaccurate test quality results is homogeneous samples because the requirements that must be met by a sample to be used in the water testing process are that the sample must be homogeneous. In addition, the factor that influences the BOD value is higher than the COD value, namely that the temperature is controlled with the temperature without control, the reduction in the COD value is more dominant because the decomposing bacteria are more optimal in decomposing the substrate according to Salmin, 2000. More clearly can be seen in **Table 2** shows the results of sampling and testing the quality of effluent and influenza to the three Sanimas WWTP surveyed.

Table 2. Quality of Efluen and Influen WWTP

No	Parameters	Quality Standards	Existing Conditions		
			L1	L2	L3
Influent Quality Testing					
1	Physical Condition		Turbid Liquid	Turbid Liquid	Turbid Liquid
2	Ph		6,47	6,97	6,89
3	COD (mg/L)		195	433	245
4	BOD (mg/L)		200	300	148
5	NH_3 (mg/L)		> 20	> 10	> 20

No	Parameters	Quality Standards	Existing Conditions		
			L1	L2	L3
6	TSS (mg/L)		248	127	198
7	Oils & Fats (mg/L)		12	>1.41	32
8	Total Coliform (Amount/100mL)		>20,000,000	40	31.000
Effluent Quality Testing					
1	Physical Condition		Turbid Liquid	Turbid Liquid	Turbid Liquid
2	Ph	6-9	7,03	6,99	8,07
3	COD (mg/L)	100	57	186*	131.18*
4	BOD (mg/L)	30	90*	100*	49.13*
5	NH_3 (mg/L)	10	> 20*	> 10*	78.5*
6	TSS (mg/L)	30	45*	42*	50*
7	Oils & Fats (mg/L)	5	2	8*	3
8	Total Coliform (Amount/100mL)	3000	4,300,000*	3,500,000*	1,360,000*

*) Groaning: Parameter exceeds the quality standard of PERMEN LHK No. 68 of 2016

Source: DLH Bandung Regency Laboratory Test Results

Information:

L1 = Sanimas Neglasari, Bandung Regency

L2 = Sanimas Sayati, Bandung Regency

L3 = Sanimas Cipaku, Bandung Regency

METHOD

The methodology in this study is to conduct literature studies, take secondary data and primary data, data processing, results, and conclusions (Jamil et al., 2020). The scope of the research area in the area of Bandung Regency in 3 (three) villages include Neglasari Village, Sayati Village and Cipaku Village which were built by Sanimas facilities. The scheme of the research methodology can be seen in **Figure 4.**

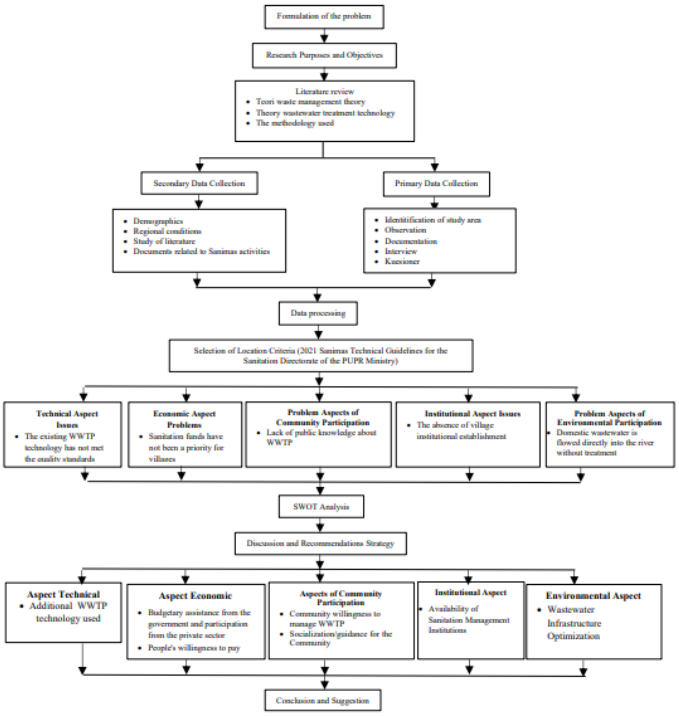

Figure 4. Research Flowchart

This study is intended to determine the variables that affect the sustainability of the use of sanimas infrastructure in Neglasari Village, Sayati Village, and Cipaku Village, Bandung Regency, to find out the indicators that have the highest contribution to explain each of the variables in this study and to develop a strategy what can be developed in an effort to continue the utilization of sanimas infrastructure in Neglasari Village, Sayati Village and Cipaku Village, Bandung Regency. First, the researcher identifies the problems that will be discussed in this study and then formulates the research objectives,and conducts field observations to find out the existing conditions of the research object. Furthermore, look for literature studies related to the research to be carried out and determine variables that will be used as indicators of the sustainability of the use of sanimas infrastructure.

DATA COLLECTION

In this study, the sampling technique used was *cluster sampling* (Retnawati, 2017). The required sample size is calculated using the Yamane equation where the Yamane equation is as follows.

n = Sample size

N =Population size $n = \frac{N}{1 + Ne^2}$

e = *Margin of error*

Based on data obtained by the number of heads of family in Neglasari Village, there are 120 heads of families, Sayati Village, is 134 heads of families and Cipaku Village is 176 heads of families. So that based on the calculation of the Yamane formula, the number of samples from Neglasari Village, Sayati Village, and Cipaku Village, Bandung Regency was 82 heads of families.

DATA PROCESSING

Data collection consists of qualitative analysis and quantitative analysis (Alfatiyah, 2017). Qualitative analysis is used to find out the environment of the company such as the strengths, weaknesses, opportunities, and threats facing the company and the SWOT matrix (Shobirin & Ali, 2019). Quantitative analysis is used on IFAS matrices, EFAS matrices, and SWOT Quadrant matrices. The quantitative data is processed using Microsoft Excel.

RESULTS AND DISCUSSION

Analysis of Existing Conditions of Sanitation Management

Analysis of the existing condition of sanitation at the research site is needed to get an idea of the existing condition of the system used by the community and identify a problem that is still found at the research site related to the condition of sanitation management. The analysis of the existing sanitation conditions in this study includes the condition of domestic wastewater management and the condition of clean water facilities and infrastructure. The condition of domestic wastewater management and the condition of clean water infrastructure and facilities are shown in Figure **5** and **Figure 6.**

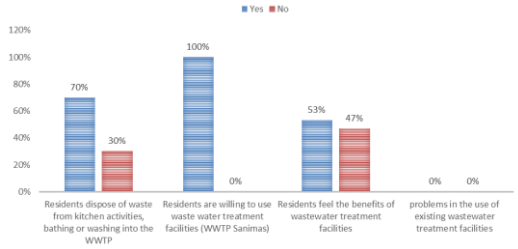

Figure 5. Graph of the condition of wastewater facilities

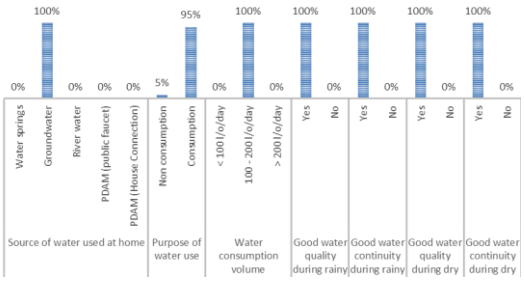

Figure 6. Graph of the condition of clean water facilities and infrastructure

IDENTIFICATION OF FACTORS FOR THE DEVELOPMENT OF THE SANIMAS WWTP SYSTEM

Based on the environmental conditions around the WWTP and according to the 2021 S animas Technical Guidelines issued by the Directorate of Sanitation of the Ministry of Public Works and Housing Rakyat, the Sanimas WWTP is designed to serve a minimum of 70 heads of families, while for MCK and WWTP Sanimas is designed to serve a minimum of 25 heads of families. Of the three locations of WWTP Sanimas which are surveyed from the upper reaches of the Citarum river basin, WWTP Sanimas Cipaku Village has users who are less than the design criteria. This can be caused because the MCK and WWTP Sanimas of Cipaku Village was built in 2016 and the Sanimas WWTP of Sayati Village was built in 2020 currently

there are fewer users because the surrounding community already has their own toilets at home. Meanwhile, another WWTP Sanimas, namely the Neglasari Village WWTP, has met the design criteria for WWTP Sanimas users. The next design criteria for WWTP Sanimas is the type of wastewater treated by WWTP Sanimas is expected to treat mixed wastewater, *black* water, and *gray water*.

The third benefit of the S animas WWTP that is surveyed is a Low Income Community (MBR) then which will be used as a selected location according to the 2021 S animas Technical Guidelines issued by the Directorate of Sanitation of the Ministry of Public Works and Housing Rakyat one location and surrounding environmental conditions, namely, Sanimas WWTP in the village Neglasari Banjaran District, Bandung Regency.

SWOT ANALYSIS

The SWOT analysis for the sustainability of Sanimas infrastructure utilization in Neglasari village can be seen in Table 3, Table **4, Table 5,** and **Table 6** below.

Table 3. IFAS *(Internal Factor Strategies)* - Strengths

No	Strategic Factors	Weight	Twig	Value
1	Sufficient technical personnel ability	0,138	3,6	0,495
2	There are already managers who have participated in training to improve their knowledge of sanitation	0,141	3,7	0,521
3	The presence of personnel who have expertise in dealing with damage in the field	0,128	3,5	0,446
4	The selected technology is in accordance with the ability to manage in maintenance and repair	0,148	3,6	0,532
5	The selected technology is one that is easy and inexpensive in operation and maintenance	0,148	3,8	0,561
6	There is a willingness of managers to play an active role	0,154	3,7	0,571
7	Society is involved in the selection of technology	0,144	3,5	0,505
Total				**3,632**

Table 4. IFAS (*Internal Factor Strategies*) - Weaknesses

No	Strategic Factors	Weight	Twig	Value
1	Managers lack the ability to manage finances	0,167	2,2	0,368
2	Performance reporting and financial management are not yet running	0,167	2,5	0,418
3	The community has not been orderly in paying dues	0,171	2,1	0,360

No	Strategic Factors	Weight	Twig	Value
4	Operating and repair costs have not fully derived from dues	0,160	2,4	0,383
5	Lack of financial benefit from the management of WWTP	0,163	2,6	0,425
6	Absence of periodic manager replacements	0,171	2,5	0,428
Total				**2,382**

Table 5. EFAS (*External Factor Strategies*) - Opportunities

No	Strategic Factors	Weight	Twig	Value
1	High community participation in the planning stage	0,141	3,7	0,520
2	High community participation in the development stage	0,150	3,9	0,584
3	High community participation in the operation and maintenance stages	0,147	3,7	0,543
4	Wastewater management has influenced the improvement of the quality of public health	0,138	3,6	0,495
5	Changes in the environment to be clean and healthy	0,147	3,7	0,543
6	There is public awareness not to dispose of wastewater carelessly	0,138	3,8	0,523
7	Increased public knowledge about clean and healthy living behaviors	0,141	3,9	0,549
Total				**3,758**

Table 6. EFAS *(External Factor Strategies)* - Threats

No	Strategic Factors	Weight	Twig	Value
1	Lack of public willingness to pay dues	0,163	3,3	0,537
2	Sanimas infrastructure development has not been fully developed based on community demand	0,171	2,5	0,426
3	Public trust in Sanimas managers is not good	0,163	2,8	0,456
4	Community income in MBR areas does not fully support the sustainability of Sanimas	0,163	2,4	0,391
5	Lack of training assistance for managers from local governments	0,167	3,1	0,517
6	Lack of private funding for sanimas infrastructure development	0,174	2,4	0,419

No	Strategic Factors	Weight	Twig	Value
Total				**2,745**

Based on the results of the SWOT scoring, the following scores were obtained:

a. IFAS

- The strength score (S) is 3,632
- The weakness score (W) is 2,382
- The X-axis is strength - weakness = 3.632 - 2.382 = 1.250

b. EFAS

- The odds score (O) is 3,758
- The threat score (T) is 2,745
- The Y-axis is the odds - threat = 3.758 - 2.745 = 1.013

From the results of the SWOT analysis, to improve the sustainability of the use of Sanimas infrastructure in Neglasari village, Banjaran District, alternative I can be used, namely development (aggressive strategy), with *Stable Growth Strategy*, which is a stable growth strategy where development is carried out gradually and targets are adjusted to existing conditions. The SWOT diagram can be seen in **Figure 7.**

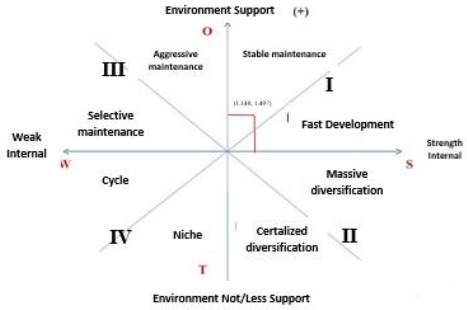

Figure 7. SWOT diagram

SANIMAS WWTP DEVELOPMENT PLANNING

Technical Aspects

The results of the effluent quality test of the Sanimas WWTP in Neglasari village still do not meet the quality standards for wastewater effluent quality which refers to the Minister of Environment and Forestry Regulation No. 68 of 2016, parameters that still do not meet the quality standards include TSS, BOD, and Ammonia. For this reason, with the strategy of improving the performance of sustainable wastewater treatment plants, the right technology can be selected and applied to reduce the burden of pollutants so that the quality standards of wastewater effluent can be met. However, in addition to not meeting the quality standards for wastewater effluent, the following are the problems found in the Neglasari Village WWTP:

1. Partially cracked and destroyed biofilter media
2. Need a local sludge treatment facility because fecal sludge trucks have difficulty accessing the site
3. Biofilter media (*plastic bottle*) quickly regas
4. No cleaning tools and slurry pumps are yet available

Seeing the problems that occur in the Sanimas WWTP in Neglasari village, the necessary technology development plans in the Sanimas WWTP in Neglasari village include:

1. Biofilter media replacement

The biofilter media used in this study used biofilter media derived from used plastic bottle packaging. This media is seen from the level of resistance of the biofilter media cracked and destroyed, so the need for media replacement can be seen in **Figure 8.**

Figure 8. Existing Biofilter Media from Packaging Bottles

According to Dorji et al., 2021 media biofilter of used plastic bottle packaging is able to reduce BOD levels by up to 89%, According to Al-Hafedh et al (2003). Media Biofilter used plastic bottle packaging is able to reduce ammonia levels by up to 29.37%. To find out the effluent value that comes out using the packaging media of used plastic bottle packaging can be seen in **Table 7:**

Table 7. Calculation of biofilter of used plastic bottle packaging media

Parameters	**Effluent value**	**% Removal**	**Exodus**	**Quality Standards PERMEN 68 of 2016**
BOD	90 mg/l	89%	9.63 mg/l	30 mg/l
Ammonia	21 mg/l	29,37%	14.83 mg/l	10 mg/l

From the results of the biofilter calculation using used plastic bottle packaging media, the BOD value is 9.63 mg / l, which means that it has met the quality standard value, while the ammonia value is still above the quality standard, which is 14.83 mg / l so that additional technology is needed.

2. Addition of a disinfectant system

Zat chemistry commonly used in chemical processing processes is with a disinfection system. The disinfection system that will be implemented in the Sanimas WWTP of Neglasari village, namely chlorine, can be seen in **Figure 9.**

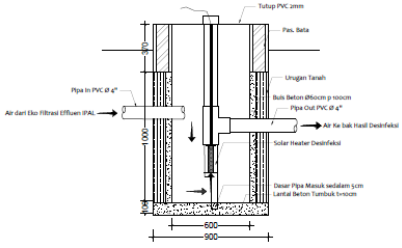

Figure 9. Chlorine Disinfection System

According to Li & Zhang (2012), disinfection using chlorine is able to reduce total coliform by up to 99.94%, disinfection using chlorine pH 6.5-8 with a retention time of at least 5 minutes. To find out the effluent value that comes out after the addition of chlorine disinfection can be seen in **Table 8**.

Table 8 Results of calculation of total coliform decrease

Parameters	**Effluent value**	**%Removal**	**Exodus**	**Quality Standards PERMEN 68 of 2016**
Total Coliform	4,300,000 amount/100ml	99,94%	2,580 amount/100ml	3000 amount/100ml

From the results of disinfection calculations using chlorine, the total value of coliform is 2,580 mg / l, which means that it has met the quality standard value.

3. *Sub-Surface Constructed Wetland*

The planned WWTP unit is the *Constructed wetland* unit. According to B. Li *et al.*, (2012) *Constructed Wetland* is able to reduce TSS levels by up to 88% and ammonia levels by 45%. To find out the value of the outgoing effluent can be seen in **Table 9.**

Table 9. The result of the calculation of the decrease in TSS and Ammonia

Parameters	**Effluent value**	**% Removal**	**Exodus**	**Quality Standards PERMEN 68 of 2016**
TSS	45 mg/l	88%	5.4 mg/l	30 mg/l
Ammonia	14.83 mg/l	45%	8 mg/l	10 mg/l

From the calculation results of *Constructed Wetland*, the TSS value is 5.4 mg / l, which means that it has met the quality standard value and the ammonia value that comes out of the biofilter has met the quality standard, which is 8 mg / l.

Institutional Aspects

To facilitate the smooth management of the use of the results of the development of technology in the field of domestic wastewater sanitation, it is necessary to create a WWTP management structure. The Organizational Structure of the utilization and maintenance group (KPP) can be seen in **Figure 10.**

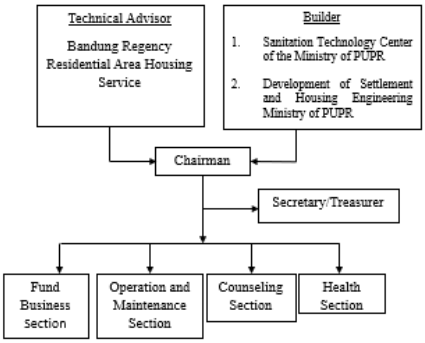

Figure 10. Organizational Structure of KPP WWTP Sanimas Neglasari Village Banjaran District, Bandung Regency

Aspects of Community Participation

Landclearing is carried out with community leaders, in the service area. The land used belongs to one local community leader who was accompanied by a land use permit to improve the performance of a sustainable domestic wastewater treatment plant. The community assistance process is planned to follow the stages of activities according to **Table 10**

Table 10. Community assistance in the service area

Phase	Topic	Participants	Output
Survei Early	Problem identification	Sanimas WWTP managers and the community	1. Test influent and *onsite* effluent, 2. Level of understanding, awareness of healthy living
Land Preparation	Consolidation with landowners	Community (landowner)	Readiness to manage by KSM
Community Data Retrieval	Interviews with managers and user communities	Managers of WWTP Sanimas and the people of Neglasari village	Recap questionnaire
Rembug Citizens	Socialization of citizens	Sanimas Neglasari WWTP managers and communities in the service area	1. Wastewater material 2. WWTP performance improvement technology material 3. Simple water quality monitoring practices
Education	Institutional, Assistance in the operation and maintenance of WWTP	Sanimas Neglasari WWTP managers and	New stewardship, SOP, simple water testing practices

Phase	Topic	Participants	Output
		communities in the service area	
	Wastewater Treatment Technology	WWTP Manager Sanimas Neglasari	Wetland

Economic Aspects

Analysis of economic investments is important to know, to give an idea of the advantages of investment activities. This Investment Analysis uses the calculation of the *Benefit Cost Ratio (BCR) analysis.* The calculation of the BCR analysis can be seen in **Table 11.**

Table 11. Investment analysis with BCR analysis calculations

No	Data Description	Neglasari WWTP, Banjaran District	Sayati WWTP, Margahayu District	WWTP Cipaku, Paseh District
1	WWTP Unit Performance	Housing	Housing	Housing
	Number of Services	70 SR	22 SR	20 SR
2	Expense			
a	Electricity	1.200.000	1.200.000	1.200.000
b	Disinfectant	600.000	300.000	300.000
c	Tool Maintenance Costs (accessories and pumps)	600.000	600.000	600.000
d	WWTP and Wetland Maintenance Wages	2.400.000	2.400.000	2.400.000
	Cost	4.800.000	4.500.000	4.500.000
3	Inclusion			
a	Citizen Dues	6.000.000	-	1.800.000
b	Sale of Garden Products	700.000	700.000	700.000
	Benefits	6.700.000	700.000	2.500.000
4.	*Benefit Cost Ratio*	1,40	0,16	0,56

From the results of the investment analysis, it was obtained that the *benefit-cost ratio* for the application of technology with the use of *Sub-Surface Constructed Wetland* for WWTP Sanimas Neglasari village, Banjaran District has a value of > 1, so it is considered economically feasible to be applied.

Environmental Aspects

Domestic wastewater that is not treated properly will result in losses because it has the potential to cause water pollution, the environment, and health problems. Environmental conditions around the Sanimas WWTP. So there is a need for an increase in domestic wastewater treatment.

CONCLUSION

There are 5 factors that affect the sustainability of the use of Sanimas infrastructure in Neglasari village, Bandung Regency in technical, economic, community participation, institutional, and environmental aspects, namely;

1. Technical Aspects

- Using a biofilter of used plastic bottle packaging media can reduce BOD, which is 89% so the BOD value comes out of 9.63 mg / l.
- Disinfection using chlorine with a pH of 6.5 - 8 can reduce the total coliform, which is 99.94% so that the total value of the coliform comes out to 2,580 amounts / 100 ml.
- With the addition of Constructed Wetland, it is able to reduce TSS, which is 88%, the TSS value comes out, which is 5.4 mg / l, and decreases ammonia, which is 45% so that the ammonia value comes out, which is 8 mg / l. So with the renewal of the biofilter, the addition of disinfection using chlorine and *Constructed Wetland* can meet quality standards.

2. Institutional Aspects

Before the establishment of the management structure of the Sanimas WWTP management has not been running well, after the establishment of the management of the Sanimas WWTP management has become better and the structure.

3. Aspects of Community Participation

The people of Neglasari village strongly agree with the continuous improvement of WWTP performance and will participate in the improvement of the program

4. Economic Aspects

Analysis *benefit-cost ratio* for the application of technology with the use of *Wetland* for WWTP Sanimas Neglasari village, Banjaran District has a value of > 1, so it is considered economically feasible to be applied.

5. Environmental Aspects

Before the improvement in the performance of the S animas WWTP, the environmental conditions around the WWTP were polluted by wastewater which would result in losses because it caused diseases for humans. After the improvement of WWTP performance, the environmental conditions of the WWTP become better.

From the results of the SWOT analysis, namely IFAS (Internal Factor Strategies) and EFAS (*External Factor Strategies*), a *strength* value of 1,250 and a competitive value of 1,013 were obtained. The position of the value is in quadrant I (first) of the second space. Alternative strategies recommended are aggressive strategies or S-O strategies. The proposed strategy includes the provision of training by the Local Government to gradually improve the ability of Sanimas managers and the addition of Sanimas infrastructure to improve the quality of the environment to be cleaner and healthier.

SUGGESTION

Based on the results of research that has been carried out, there are inputs that can be followed up by local governments, namely: it is necessary to hold continuous socialization by local governments to increase public awareness of the use of Sanimas WWTP.

REFERENCES

Alfatiyah, R. (2017). Analisis manajemen risiko keselamatan dan kesehatan kerja dengan menggunakan metode HIRARC pada pekerjaan seksi casting. *SINTEK JURNAL: Jurnal Ilmiah Teknik Mesin*, *11*(2), 88–101.

Al-Hafedh, Y. S., Alam, A., & Alam, M. A. (2003). Performance of plastic biofilter media with different configuration in a water recirculation system for the culture of Nile tilapia (Oreochromis niloticus). *Aquacultural Engineering*, *29*(3–4), 139–154.

Chahyadi, D. (2007). *Evaluasi Sistem Pengelolaan Air Limbah Domestik Terdesentralisasi di Daerah Pingit Kecamatan Jetis Yogyakarta*.

Hasbiah, A. W. (2021). Analisa Kinerja Instalasi Pengolahan Air Limbah Domestik di Kota Cimahi. *HIBAH PENELITIAN FAKULTAS TEKNIK UNPAS*.

Islam, F., Priastomo, Y., Mahawati, E., Utami, N., Budiastutik, I., Hairuddin, M. C., Fatma, F., Akbar, F., Ningsih, W. I. F., & Adiningsih, R. (2021). *Dasar-dasar kesehatan Lingkungan*. Yayasan Kita Menulis.

Jamil, F., Mukhaiyar, R., & Husnaini, I. (2020). Kajian Literatur Rekonstruksi Mata Kuliah (Studi Kasus Mata Kuliah Pengolahan Sinyal Teknik Elektro UNP). *JTEV (Jurnal Teknik Elektro Dan Vokasional)*, *6*(2), 198–203.

Kurniawan, M. W. (2013). Strategi pengelolaan air limbah sentra UMKM batik yang berkelanjutan di kabupaten Sukoharjo. *Jurnal Ilmu Lingkungan*, *11*(2), 62–72.

Kusumastuti, D. S. (2008). *Tinjauan yuridis pelaksanaan penerapan produksi bersih dan pengendalian pencemaran air pada industri kecil menengah batik di kampoeng batik Laweyan Surakarta*.

Li, B., & Zhang, T. (2012). pH significantly affects removal of trace antibiotics in chlorination of municWWTP wastewater. *Water Research*, *46*(11), 3703–3713.

Mayasari, E., Sari, F. E., & Yulyani, V. (2022). Hubungan Air Dan Sanitasi Dengan Kejadian Stunting Diwilayah Kerja Upt Puskesmas Candipuro Kabupaten Lampung Selatan Tahun 2021. *Indonesian Journal of Health and Medical*, *2*(1).

PANGESTU, M. P. (2021). *Pengaruh Keberadaan WWTP Komunal Terhadap Area Risiko Sanitasi Tinggi Sektor Air Limbah Di Kabupaten Sleman*.

Prihatin, R. B. (2015). Alih fungsi lahan di perkotaan (Studi kasus di Kota Bandung dan Yogyakarta). *Jurnal Aspirasi*, *6*(2), 105–118.

Retnawati, H. (2017). Teknik Pengambilan Sampel. *Disampaikan Pada Workshop Update Penelitian Kuantitatif, Teknik Sampling, Analisis Data, Dan Isu Plagiarisme*, 1–7.

Shobirin, M., & Ali, H. (2019). Strategi Pengembangan Infrastruktur dalam Meningkatkan Pelayanan Penumpang di Bandar Udara Internasional Soekarno Hatta Cengkareng. *Jurnal Ekonomi Manajemen Sistem Informasi*, *1*(2), 155–168.

Standard, D. W. Q. (2017). Pengembangan Proses pada Sistem Anaerobic Baffled Reactor untuk Memenuhi Baku Mutu Air Limbah Domestik. *Jurnal Permukiman Vol*, *12*(2), 70–79.

Yudo, S., & Said, N. I. (2017). Kebijakan Dan Strategi Pengelolaanair Limbah Domestik Di Indonesia. *Jurnal Rekayasa Lingkungan*, *10*(2).