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**Implementation of 3R (Reduce, Reuse, Recycle) in Household Waste Management in Krembangan Utara Urban Village Pabean Cantikan Subdistrict Surabaya City in 2025**

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**ABSTRACT**

**Background:** Given that Krembangan Utara is a highly populated area—16,744 people spread within 0.68 km<sup>2</sup>—reduce, reuse, and recycle (3R) waste management is essential. Waste can be reduced and some of it can be used by putting the 3Rs into practice. **Object:** Analyzing the 3Rs' application to home trash management in Krembangan Utara Urban Village, Pabean Cantikan District, Surabaya City, in 2025 is the goal of this study **Methods:** A sample of 51 homes was chosen at random from 2,606 homes as part of the cross-sectional study design. Measurement, interviews, and observation were used to gather data, which were then subjected to descriptive analysis. **Results.** The results showed that the average waste generation reached 0.61 kg/person/day, with a composition of 32% organic and 68% inorganic waste. The implementation of reduce reached 71% good and 29% sufficient; reuse 45% good, 43% sufficient, and 12% less; and recycle 2% good, 16% sufficient, and 82% less. **Conclusion:** Based on the results obtained, it is known that no confidence was gained in the use of basil seeds as a bio-coagulant to reduce turbidity. It is concluded that the average waste generation per person in Krembangan Utara Village has exceeded the SNI 19-3983-1995 standard (0.350-0.400 kg/person/day). The waste composition is mostly inorganic (68%), and the implementation of the 3Rs is mostly in the moderate category (82%). Socialization programs are needed, such as counseling and workshops on recycling, sorting of waste types from the source, and the establishment of waste banks in each RW.

**Keywords:** 3R Implementation, Waste Management, Generation, Compositition

**BACKGROUND**

One of the biggest problems urban areas in developing countries face is waste management. Waste production has increased as a result of urbanization, industrialization, economic growth, and population expansion (Windasrawa & Prihastuti, 2017). Consequently, waste generation has been steadily rising, particularly in cities like Surabaya. As a major city, Surabaya is expected to experience a population increase of approximately 133,000 people between 2022 and 2025. This growth presents

serious challenges in waste management, especially in the household sector.

Household waste—consisting of food scraps, plastic, paper, and other materials—accounts for the majority of total municipal waste. According to 2024 data from the National Waste Management Information System (SIPSN), Surabaya produces approximately 1,800 tons of waste per day. The volume and composition of household waste depend on the number of occupants and the activities within a

household. The more occupants and daily activities, the greater the variation in the types, characteristics, and weight of waste generated, which can lead to increased environmental problems, both directly and indirectly (Damanhuri & Padmi, 2010). Unfortunately, many people still view waste negatively, considering it something disgusting, which often leads to neglect in waste management practices (Noviyanti, 2023). Improper waste management can cause various negative impacts, including environmental pollution and public health issues.

One of the solutions highlighted in Law No. 18 of 2008 on Waste Management is the application of the 3R principles (Reduce, Reuse, Recycle) to address these issues. The 3R principles encourage the public to reduce waste generation, reuse items that are still functional, and recycle waste to create economic value. Implementing the 3R approach at the household level is particularly effective because it is easy to apply, cost-efficient, and has a direct positive impact on the environment.

In practice, however, community adoption of the 3R concept remains suboptimal. A Pekanbaru City research found that despite initiatives to increase public awareness, there was little community involvement in trash management through the waste bank program (Afriadi et al, 2019). Based on the achievement indicators of the fourth pillar of the Community-Based Total Sanitation (STBM) program—related to household waste management—Krembangan Utara Village recorded the lowest performance among villages in the Perak Timur Health Center service area, with an achievement rate of 85.68%. Krembangan Utara is a densely populated area, with 16,744 residents living within 16.5 hectares.

A preliminary survey conducted in five households in Krembangan Utara Village showed that the average waste generation was 0.43 kg per person per day,

exceeding the national standard (SNI 19-3983-1995), which sets waste generation for permanent residences in medium and small cities at 0.350–0.400 kg per person per day. Observations also revealed waste piles around residents' homes and inadequate waste bins that lacked covers, resulting in scattered garbage and unpleasant odors.

Because Krembangan Utara Village is one of the most densely inhabited areas and has daily trash generation rates that beyond national requirements, research on the application of the 3R (Reduce, Reuse, Recycle) principles in home waste management is required. Although the 3R principles are widely recognized as an effective waste reduction strategy, their implementation at the household level remains limited, as shown by the low levels of waste reduction, reuse, and recycling practices in the community (Marliani, 2014). Therefore, this research is important as a scientific basis to analyze the implementation of 3R principles in household waste management in Krembangan Utara Village, Pabean Cantian District, Surabaya City, in 2025.

## RESEARCH METHODS

This study employs a descriptive method with a qualitative approach and was conducted in Krembangan Utara Village, Pabean Cantian District, Surabaya City. The population in this study consists of 2,606 households, with housewives as the unit of analysis. A sample of 51 households was selected using stratified random sampling. Data related to waste generation, waste composition, and the implementation of the 3R principles were collected through observation, measurement, and interviews. The data were then processed, presented in tabular form, and analyzed descriptively using the SNI 19-3983-1995 standard and the STBM Implementation Guidelines. This study underwent an ethical review and was declared to pose no risk to human subjects; therefore, no further ethical testing was required.

## RESULTS AND DISCUSSION

### A. Average Amount of Household Waste Generated Per Person Per Day

The measurement of water turbidity using basil seed biocoagulant was carried out at the Laboratory of the

Agency for Standardization and Industrial Service Policy, Ministry of Industry. The turbidity level was measured using the Nephelometric method with biocoagulant doses of 0.5 mL, 1 mL, 1.5 mL, and 2 mL.

**Table 1.**

Average Household Waste Generation per Person per Day in Krembangan Utara

RW	Quantity of Houses	Quantity of Residents	Amount of Waste (kg)	Amount of Waste (kg/hari)	Amount of Waste (kg/orang/hari)
1	7	42	187,72	26,81	0,64
2	8	40	182,25	26,03	0,65
3	3	13	46,75	6,67	0,51
4	2	9	30,95	4,42	0,49
5	7	45	182,23	26,03	0,58
6	4	17	62,61	8,94	0,53
7	4	23	85,94	12,27	0,53
8	7	28	124,60	17,80	0,64
9	4	19	80,74	11,53	0,61
10	5	28	140,87	20,12	0,72
<b>Amount</b>	<b>51</b>	<b>264</b>	<b>1124,66</b>	<b>160,62</b>	<b>6,10</b>
<b>Range</b>	<b>2 – 8</b>	<b>9 – 45</b>	<b>30,95 – 187,72</b>	<b>4,42 – 26,81</b>	<b>0,49 – 0,72</b>
<b>Average</b>	<b>5</b>	<b>26</b>	<b>112,466</b>	<b>16,062</b>	<b>0,61</b>

Based on the table, it is known that the average amount of waste generated per person per day is 0.61 kg/person/day, with a range of 0.49–0.72 kg/person/day. This result indicates that the amount of waste generated exceeds the standard set by SNI 19-3983-1995 regarding Specifications for Waste Generation in Medium-Sized and Small Cities, which stipulates a waste generation rate of 0.350–0.400 kg based on the source of waste, specifically permanent residences. This will be one of the sources of household waste generation in Surabaya

and could lead to pollution issues if not properly managed through waste reduction measures, including the implementation of the 3R principles (Reduce, Reuse, Recycle).

### B. Waste Composition

The results of the identification of the composition of daily household waste for 7 days in Krembangan Utara Village, Surabaya, in 2025 are presented in the following table.

**Table 2.**

Percentage of Household Waste Composition in Krembangan Utara Village in 2025

RW	Type of Waste				Total	
	Organic		Anorganic		Quantity (Kg)	%
	Quantity (Kg)	%	Quantity (Kg)	%		
1	74,45	40	113,27	60	187,72	100
2	39,89	22	142,36	78	182,25	100
3	14,90	32	31,85	68	46,75	100
4	8,03	26	22,92	74	30,95	100
5	46,04	25	136,19	75	182,23	100
6	21,07	34	41,54	66	62,61	100
7	28,10	32	57,84	68	85,94	100
8	40,28	32	84,32	68	124,60	100
9	28,01	35	52,73	65	80,74	100
10	53,88	38	86,99	62	140,87	100
<b>Amount</b>	<b>354,65</b>	<b>316</b>	<b>770,01</b>	<b>684</b>	<b>1124,66</b>	<b>1.000</b>
<b>Range</b>	<b>8,03 – 74,45</b>	<b>22 – 40</b>	<b>22,92 – 142,36</b>	<b>60 – 78</b>	<b>30,95 – 187,72</b>	<b>100</b>
<b>Average</b>	<b>35,46</b>	<b>32</b>	<b>77,00</b>	<b>68</b>	<b>112,466</b>	<b>100</b>

Based on the table, it is known that the results of the identification of the composition of household waste in Krembangan Utara Village are 32% organic waste and 68% inorganic waste, so it can be concluded that the composition of household waste in Krembangan Utara Village is inorganic waste. The dominant composition of inorganic waste, accounting for 68% of household waste, is one of the causes of high waste generation, as inorganic waste is difficult to decompose, leading to continuous accumulation and potentially significant environmental impacts if not managed properly. Due to its non-biodegradable nature, proper management of inorganic waste is crucial to prevent environmental pollution and negative health impacts on humans.

### C. Implementation of 3R (Reduce, Reuse, Recycle) in Household Waste Management in Krembangan Utara Village

The results of the analysis of the implementation of 3R (Reduce, Reuse, Recycle) in household waste management in Krembangan Utara

Village in 2025 are presented in the following table below.

**Table 3.**

Implementation of 3R for Household Waste in Krembangan Utara Village in 2025

Category	Score	Percentage
Good	6	12%
Adequate	42	82%
Poor	3	6%
<b>Total</b>	<b>51</b>	<b>100%</b>

Based on the results of the analysis of the implementation of the 3R (Reduce, Reuse, Recycle) waste management system for household waste in the Krembangan Utara subdistrict of Surabaya, it was found that the majority of cases fall into the “adequate” category (82%), while 12% fall into the “good” category, and 6% fall into the ‘poor’ category. The average implementation of the 3R system in the Krembangan Utara subdistrict is in the “adequate” category. Based on these results, it is evident that applying the 3R principles (Reduce, Reuse, Recycle) in household

waste management can influence the amount of waste generated. The amount of waste generated can also be influenced by the number of family members in a household. One of the factors influencing the implementation of the 3R principles is the level of public understanding of the importance of waste management.

## DISCUSSION

According to the study's findings, applying the 3Rs (Reduce, Reuse, Recycle) to home trash management in Krembangan Utara Village is mostly categorized as adequate (82%), with 12% categorized as good and 6% as poor. The application of the reduce principle is the most dominant, as indicated by 71% of respondents falling into the good category. This suggests that most residents have adopted preventive measures such as storing food in appropriate quantities, bringing reusable shopping bags, and using recyclable packaging. The reduce principle aligns with the STBM (Community-Based Total Sanitation) Implementation Guidelines issued by the Ministry of Health, which state that waste reduction must begin with behavioral and consumption pattern changes at the household level (Kementerian Kesehatan, 2023).

However, the implementation of the reuse principle varies, with 45% of respondents categorized as good, 43% as adequate, and 12% as poor. This shows that not all households are accustomed to reusing items such as bottles, cardboard, or food containers. Although this principle is relatively easy and cost-effective to apply, it requires a proper understanding and the development of consistent habits. According to the 3R concept in Law No. 18 of 2008, reuse is an essential part of the waste reduction strategy that should be implemented by all segments of society.

Meanwhile, the recycle principle shows the lowest level of implementation, with 82% of respondents falling into the poor category. This is mostly because

there is a lack of information, expertise, and infrastructure to support it, such as garbage banks or recycling facilities. Data from the Ministry of Environment and Forestry supports this low recycling rate (KLHK), which shows that only around 10% of household waste is successfully recycled in Indonesia. According to Law No. 18 of 2008, Articles 19–22, recycling is part of the waste reduction and management efforts that must be carried out collaboratively by the government and the public.

Furthermore, Krembangan Utara Village generates an average of 0.61 kg of waste per person per day, which exceeds the national standard based on SNI 19-3983-1995, which sets the limit at 0.350–0.400 kg/person/day for permanent dwellings. This suggests that, although the 3R concept has begun to be implemented, it has not yet had a significant impact on reducing waste generation. In theory, household size, consumption habits, and public awareness of waste management greatly influence the quantity and type of waste produced (Sistem Informasi Pengelolaan Sampah, 2022).

Research conducted in Krembangan Utara Village also shows that inorganic waste dominates, accounting for 68% of household waste composition (including plastic, paper, cloth, glass, etc.), while organic waste makes up the remaining 32%, mainly from dry leaves and food scraps. According to (Marliani, 2014), the presence of inorganic waste in the environment has negative consequences. One of the impacts is the emission of unpleasant odors and the degradation of environmental aesthetics. Additionally, the improper handling of inorganic waste can harm public health, thereby reducing community productivity.

These results are in line with earlier studies by (Rahim & Indirawati (2022), which found that household waste management based on the 3R principles in Labuhan Deli Village, Medan City was

also in the low category, with 89.8% of housewives not yet applying the 3R concept. The average result of 82% in Krembangan Utara Village similarly falls into the adequate category in terms of 3R-based household waste management. Both studies suggest that housewives have not yet fully adopted the application of the 3R principles. This suggests that in order to improve the efficacy of the 3R program at the home level, a thorough and context-sensitive approach that considers the social, economic, and cultural circumstances of the community is required (Nindita, 2017).

According to the STBM Implementation Guidelines issued by the Ministry of Health, the concept of 3R-based waste management aims to prevent waste generation, reduce waste by encouraging the use of reusable and biodegradable materials, and implement environmentally friendly waste treatment systems. The community's adoption of 3R practices encourages behavioral, attitudinal, and mentality shifts that contribute to the development of an ecologically conscious society. The 3R principles can be applied by anyone, anytime, and anywhere (Bastiaans, 1984).

To improve the implementation of the 3R principles, educational initiatives such as waste management counseling and the provision of supporting infrastructure—such as waste banks at the neighborhood (RW) level—are essential. According to the national waste management strategy, a cleaner, healthier, and more sustainable environment may be built by implementing the 3R principles effectively at the home level. This will also help to minimize the amount of garbage that is dumped in landfills.

## CONCLUSION

Based on the results of the analysis, *"Implementation of 3R (Reduce, Reuse, Recycle) in Household Waste Management in the Pabean Cantian Subdistrict of Surabaya City in 2025,"* it

was found that household waste generation in Krembangan Utara Subdistrict ranges from 30.95 kg/day to 187.72 kg/day, with an average of 112.47 kg/day, indicating a significant issue in waste management. The average waste production per person is 0.61 kg/person/day, which exceeds the national standard SNI 19-3983-1995, set at 0.350–0.400 kg/person/day for permanent residences. The composition of household waste is dominated by inorganic waste (68%), while organic waste accounts for 32%, indicating an imbalance in the types of waste generated.

A total of 71% of housewives have implemented reduce practices, while 29% have not, showing a relatively high level of awareness regarding waste reduction. However, only 45% of housewives practice reuse, while 55% do not, indicating a need for increased education and awareness on the reuse of household items. The level of recycling implementation is very low, with 82% of households categorized as poor, 16% as adequate, and only 2% as good in their recycling efforts.

Overall, the implementation of the 3R principles (Reduce, Reuse, Recycle) in Krembangan Utara Subdistrict is considered adequate, with 82% of households falling into the adequate category, 12% into the good category, and 6% into the poor category.

These results highlight the urgent need for more effective educational and intervention programs to improve community awareness and waste management practices. Recommended efforts include conducting regular community outreach, such as quarterly training sessions for Surabaya Great Cadres (KSH) on the importance of the 3R principles, as well as workshops focused on recycling, such as craft-making activities using inorganic waste in Krembangan Utara Village.

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