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Analysis Of Waste Management in Kledung Village Temanggung Regency

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ABSTRACT

Kledung Village is one of the villages where there are quite a lot of tourism activities. This causes the village to produce waste from sources other than the local community. Waste management should be the responsibility of all parties, including the government, community, and visitors. This research aims to formulate a waste management strategy that can be implemented in Kledung Village, Temanggung Regency. This research is descriptive research using a mixed qualitative and quantitative approach. Data collection was carried out by observation, questionnaires, interviews, and the collection of waste samples to determine the generation and composition of waste. The aspect studied refers to the waste management aspect in SNI 3242-2008 concerning Residential Waste Management. The data obtained was analyzed using SWOT analysis to determine the appropriate waste management strategy. The SWOT analysis results show that waste management in Kledung Village is in quadrant II of the SWOT diagram, which means that existing waste management is in good condition but faces serious challenges. The recommended strategy is to diversify strategies by increasing tactical strategies. The strategy can be pursued by implementing the community-based 3R waste management model.

Keywords: *waste management, residential waste, tourism waste*.

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1. INTRODUCTION

The environment, as a place where humans depend for their lives, needs to be preserved so that it can be used sustainably. As time passes, the level of human exploitation of natural resources continues to increase. The increase in population accompanied by changes in lifestyle has resulted in an increase in the volume, types, and characteristics of increasingly diverse waste. The increase in population causes an increase in activities that have the potential to produce waste (Mutaqin, 2018).

The amount of waste generated in Indonesia increases yearly, correlating with population growth. Data from the Indonesian Plastic Industry Association (INAPLAS)

and the Central Statistics Agency (BPS) states that Indonesia can produce up to 64 million tons of plastic waste every year, and there are 3.2 million tons of plastic waste that will end up in the ocean while around 85,000 tons of plastic bags will be wasted on land (Lestari et al., 2015).

One of the human commitments to preserving the environment can be done through waste management efforts. Currently, more than 90% of districts/cities in Indonesia still manage waste using an open dumping system; that is, waste is simply thrown away in a final disposal site without being managed. Efforts to sort and manage waste are still very limited, so waste is buried in landfills (Fitri, 2019). Many landfills are at or almost over capacity. One of the almost over capacity landfills is the Sanggrahan landfill, which is in Kranggan District, Temanggung Regency. The Sanggrahan landfill has an area of 4 hectares, which has been filled to more than 90% and will exceed capacity. Based on the Waste Free Temanggung (TBS) program report in 2020, the Temanggung Regency is predicted to produce 486.8 tons of waste/day (Purnomo & Bakhtiar, 2022).

The Sanggrahan Landfill accommodates waste throughout Temanggung Regency, including household waste. Waste can come from various activities ranging from residential activities to tourism activities. Temanggung Regency has beautiful natural landscapes and has great potential to be developed into a tourism product. Popular natural tourism products in Temanggung Regency include Embung Kledung and Mount Sindoro Climbing tourism which is in Kledung Village. The high public interest in natural tourism has the potential to have a negative impact on environmental sustainability if there are no control efforts from the management (Putranto et al., 2020).

The high number of visitors has an impact on the high amount of waste produced from these activities. Mount Sindoro and Embung Kledung climbing tourism are two tourism products that have the potential to produce waste. To support tourism development in Temanggung Regency, efforts need to be made to overcome problems related to waste, especially tourism. An appropriate waste management strategy is very necessary, so it is necessary to analyze environmental conditions, infrastructure, availability of human resources and other supporting aspects to be able to formulate a waste management strategy.

2. METHODS

This type of research is descriptive research using a mixed approach, namely qualitative and quantitative. A quantitative approach is used to research certain populations or samples, data collection uses research instruments, and data analysis is quantitative/statistical. Quantitative data was obtained using questionnaires and waste sampling. Waste sampling refers to SNI 19-3964-1994 concerning Methods for Collecting and Measuring Urban Waste Generation and Composition Samples. Qualitative data was obtained from interviews, field observations, documentation, and interpretation of quantitative data to be analyzed using SWOT analysis.

The population in this study was the population of Kledung Village at a productive age of 1,587 people, the climber population was assumed to be 500 people and the visitor

population of Kledung Embung was assumed to be 300 people. The samples taken as respondents were 94 residents of Kledung Village, 75 climbers, and 45 visitors to Embung Kledung. There were waste samples from 11 houses, 24 climbing groups, and 16 rubbish bins in Embung Kledung.

3. RESULTS AND DISCUSSION

Kledung Village Waste Management

- **Operational Aspects**

The waste produced in Kledung Village comes from residential activities and tourism activities, namely Mount Sindoro climbing tours and Embung Kledung tourism. Final waste processing is carried out at the Kledung Village waste processing site by 3 employees. In general, waste is separated into 3 types: organic, sellable, and residue. Sellable waste will be sold directly to collectors and transported by the collectors themselves. Some of the residual waste will be burned by officers, and the rest will be transferred to dump trucks for further transportation to the Temanggung district landfill. Burning of this residual waste is still carried out in open areas with the aim of reducing the volume of residue transported. When the research was underway, organic waste management was still in the development stage to be produced into compost for later sale to increase income for waste processing operational costs.

- **Financing Aspect**

The construction of the Kledung Village Waste Processing Site was carried out by the Temanggung Regency Public Works Service based on the results of a proposal from the Kledung Village government. Operational costs come from the local government budget, routine community fees of IDR 5,000 per house per month, and incentives from sales of recycled materials. The results of interviews conducted with the waste processing officer stated that the budget for operational needs was still insufficient. The local government budget provided is only for providing fuel and repairing infrastructure. Routine community contributions and proceeds from the sale of recycled materials are used to provide wages to operators and provide fuel or repair infrastructure on a small scale.

- **Regulatory Aspect**

Kledung Village does not yet have a legal product relating to village waste management, so operational technicalities for implementing village waste management refer to regional-level regulations or unwritten regulations resulting from deliberations of the Kledung Village community. The existing unwritten regulations are the result of deliberations at the beginning of the formation of the Kledung Villagu Waste Processing Site, so in some respects, the agreement has not been adapted to current needs.

- **Institutional Aspect**

The Kledung Village Waste Processing Site institution is run by 4 people consisting of 1 person as a chairman and three people as waste operators. This number is still insufficient to meet the staff needed at the polling stations. The selection of institutional members is based on direct appointment and members' willingness to join the group. The

existing institutions at the Kledung Village Waste Processing Site have not been formed by existing regulations because they are still based on the existing community capacity.

- **Participation Aspect**

The participation aspect was studied through social analysis with the aim of determining the level of knowledge, perception, and community participation regarding waste management in Kledung Village. The knowledge of the people of Kledung Village is in the medium category, while the knowledge of climbers and visitors to the Embung is in the high category.

The perception of the public, climbers, and visitors is high. Positive perceptions can be formed because the living environment is conducive to implementing waste management; apart from that, it is also supported by the high role of community leaders and the availability of adequate infrastructure (Nugraha et al., 2018). This positive perception shows that the waste management already underway in Kledung Village, climbing tourism, and Embung Kledung tourism are in good condition.

The level of participation of the community and visitors to Embung Kledung is in the high category, while climbers are in the very high category. A high level of participation has its own character so that the community is independent and can partner with other parties, meaning that the community can consciously accommodate waste independently and has its own initiative (Martinawatati et al., 2016). The forms of participation taken at the implementation stage include the willingness to pay levies, utilize existing facilities, and the willingness to make efforts to reduce waste.

Waste Generated

The results of research on waste generation calculations in Kledung Village calculated from 3 activity sources are presented in the following table.

Table 1. Waste Generated

Waste Source	Average weight of waste (kg/person/day)	Average volume of waste (m^3/person/day)
Resident	0,25	0,012
Climber	0,52	0,019
Visitor	0,29	0,010

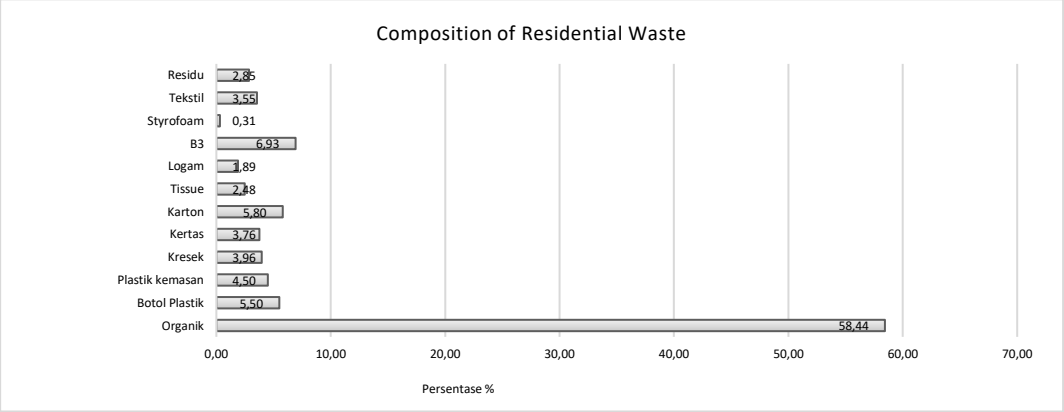
Based on the data presented above, the amount of waste from residential and climbing activities is almost the same as research that has been carried out previously, such as research by Sudiro et al. (2018) research on the generation of climbing waste on Mount Prau on the Patak Banteng route by Asy'arie (2018). The amount of Embung Kledung waste is a large figure for waste generation from tourism activities. As a comparison, research conducted by Megi (2019) on similar tourism, namely Lake Singkarak, found that the amount of waste generation was 0.021 kg/person/day.

The total amount of waste generated daily in Kledung Village ranges from 801.2 kg – 925.5 kg or around 38 – 42.5 m^3. This number was obtained by calculating the amount of waste generation per person multiplied by the number of residents, climbers, and visitors to the embung. Tourist activities are generally busier with visitors on holidays

or peak season; therefore, the calculation of waste generation is calculated between weekdays and holidays, with an estimate of the number of visitors being greater on holidays.

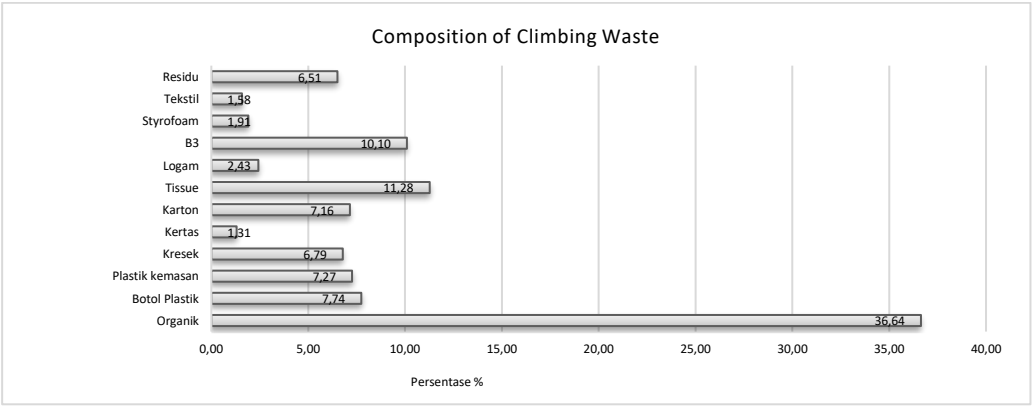
Waste Composition

The research results on measuring waste composition in Kledung Village are presented in the following diagram.



Picture 1. Composition of Residential Waste

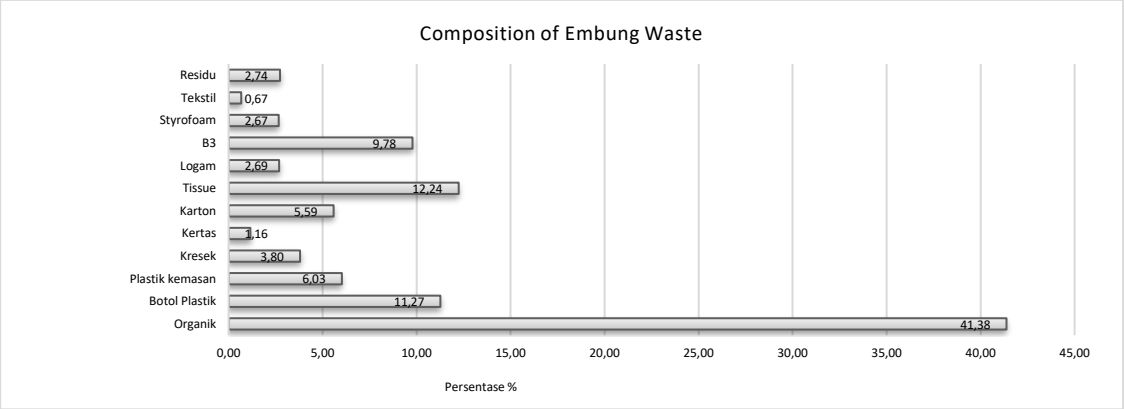
The most abundant type of waste is organic waste, at 58.44% of the total waste, weighing 54.68 kg. The most abundant type of waste is organic waste, which accounts for 58% of the total waste, namely 54.68 kg. Plastic waste contributed greatly to Kledung Village residential waste, with a total percentage of 14% of the waste sample weighing 13.06 kg. Plastic waste is the most common inorganic waste found in residential waste, according to previous research; this is a common condition in residential waste (Hapsari & Herumurti, 2017).



Picture 2. Composition of Climbing Waste

The most common type of waste produced from climbing waste is organic waste, namely 36.64% or weighing 19.92 kg. Based on the graph presented, the amount of inorganic waste obtained from the total percentage of residual waste, textiles, styrofoam, B3, metal, tissue, cardboard, paper, plastic bags, plastic packaging, and plastic bottles in the Mount Sindoro climbing waste sample is 63.36%. B3 waste is the second most abundant inorganic waste, consisting of wound plasters, used medicines, sanitary napkins, and the most abundant is wet wipes. The Mount Sindoro climbing management

has banned the use of wet wipes on the mountain because this waste includes B3 waste, which cannot be decomposed or recycled. Field facts show that the use of wet wipes is still quite high, which means that climbing managers have not strictly implemented these regulations.

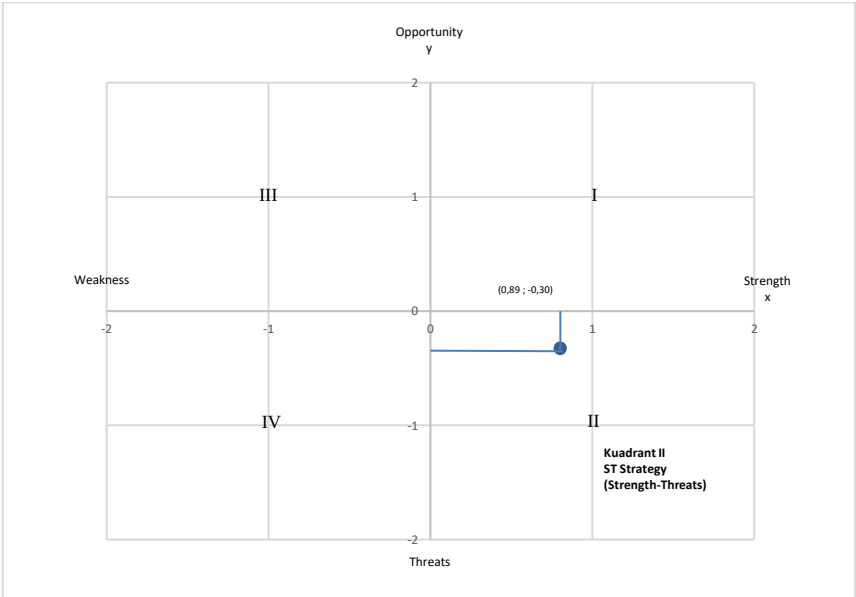


Picture 3. Composition of Embung Waste

The amount of organic waste is 41.38% of the total weight of embung waste, which is 17.85 kg. The second type of waste that dominates Embung tourist waste is plastic waste, with a total weight of 21.1%, consisting of plastic bottles, packaging, and plastic bags. Tissue waste and B3 waste also have a high percentage. Tissue is a staple item used for climbing and tourism activities in Embung because it is very practical.

Waste Management Strategy for Kledung Village

Based on the SWOT diagram above shows that Waste Management in Kledung Village is in quadrant II.



Picture 4. SWOT Diagram

The recommended strategy to be implemented in waste management in Kledung Village is the ST (Strength – Threats) strategy. This strategy is a combination of internal strength factors and external threat factors; namely, by utilizing all the strengths, we must

overcome existing threats. ST strategies that can be adopted in Waste Management in Kledung Village are:

- **Improve waste management capabilities**

Kledung Village already has adequate waste management facilities and infrastructure. Increasing waste management capabilities needs to be carried out to achieve more effective and efficient waste management.

- **Increasing the socio-cultural role of the community in waste management**

Tourism activities in Kledung Village have the potential to become a gateway for new cultures brought in by tourists from outside Kledung Village. Incoming culture can cause changes in the culture of native people in terms of social and lifestyle. The social and cultural role of the community needs to be increased so that the original culture of the community can be maintained and is not led by tourist culture but can invite tourists to participate in the existing culture.

- **Maximizing the 3R waste management concept**

The waste management implemented at the Kledung Village TPS has implemented the 3R concept so that the minimum amount of waste transported to the TPA is carried out. Maximizing the 3R concept also helps to reduce operational costs.

4. CONCLUSIONS

Based on the research that has been carried out, it can be concluded that the waste condition in Kledung Village is in good condition but faces serious challenges, so the recommended strategy is a diversification strategy. This strategy is carried out by utilizing existing strengths to face existing threats. The waste management model that can be implemented is a community-based 3R system. This recommendation is based on several aspects, such as waste generation, waste composition, community understanding, community will, and area characteristics.

REFERENCES

Asy'arie, T. (2018). Study of Waste Conditions and Behavior Patterns of Porters, Climbers and Visitors in Developing Waste Management Strategies on the Mount Prau Via Patak Banteng Climbing Route [Thesis]. Universitas Islam Indonesia.

Fitri, R. F., Ati, N. U., & Suyeno, S. (2019). Implementation of Government Policy in Integrated Waste Management Innovation (Case Study at Randegan Landfill Park Mojokerto City). *Respon Publik*, *13*(4), 12-18.

Hapsari, D. S. A., & Herumurti, W. (2017). Generation Rate and Composition of Household Waste in Sukolilo District, Surabaya. *Jurnal Teknik ITS*, *6*(2), C92-C95.

Lestari, M. A., Santoso, M. B., & Mulyana, N. (2020). Application of participatory rural appraisal (PRA) techniques in dealing with waste problems. *Jurnal Penelitian dan Pengabdian Kepada Masyarakat (JPPM)*, *1*(1), 55-61.

Martinawati, M., Zahri, I., & Faizal, M. F. M. (2016). Community Participation in Household Waste Management: A Study in Sukarami District, Palembang City. *Jurnal Penelitian Sains*, *18*(1), 14-21.

Megi, P. (2019). Study of Waste Generation, Composition, Characteristics and Recycling Potential, Lake Singkarak Tourism Area, West Sumatra [Dissertation]. Universitas Andalas.

Mutaqin, A. Z. (2018). Management of Household Organic Waste in Overcoming Environmental Pollution in Bumiwangi Village, Ciparay District, Bandung Regency. *GEOAREA Jurnal Geografi*, *1*(1), 33-37.

Nugraha, A., Sutjahjo, S. H., & Amin, A. A. (2018). Analysis of community perceptions and participation in household waste management in South Jakarta. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, *8*(1), 7-14.

Purnomo, S. W., & Bakhtiar, A. (2022). Design and feasibility study for building a plastic waste management company in Temanggung district. *Industrial Engineering Online Journal*, *11*(4).

Putranto, D. R., Hariyanto, H., & Benardi, A. I. (2020). Mountain Climber Behavior in Reducing Environmental Damage that Occurs in Mount Merbabu National Park. *Edu Geography*, *8*(2), 121-129.

Sudiro, S., Setyawan, A., & Nulhakim, L. (2018). Residential Waste Management Model in Tunjung Sekar Village, Malang City. *Plano Madani: Jurnal Perencanaan Wilayah dan Kota*, *7*(1), 106-117.