Strategies to Strengthen the Role of Women in Sustainable Waste Management: a SWOT Study in the Village of Daleman Kidul

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ABSTRACT. Waste management in Indonesia has become a pressing environmental issue due to population growth and urbanization. With around 250 million people, Indonesia is the fourth most populous country and the second largest contributor of plastic waste in the world. By 2024, an estimated 19.5 million tons of waste is generated annually, yet only 46.1% is properly managed. Effective management is important to achieve the Sustainable Development Goals (SDGs), particularly responsible consumption and production. Community-based waste management (CBWM) that empowers women is a solution to waste reduction. This research optimizes the role of women in sustainable waste management through a case study of the Nawasena Kemala Digital Waste House in Daleman Kidul Village. A descriptive qualitative method with in-depth interviews, observation, and data triangulation was used. Results showed that women play a central role in collecting, sorting, and processing waste into economically valuable products, but face obstacles such as lack of incentives, training, and community awareness. SWOT analysis revealed strengths of women's active role and community innovation, weaknesses of limited training and facilities, opportunities of policy support and incentives, and threats of lack of participation and funding. Policy implications emphasize the need for incentives, certification training, and gender integration for sustainable waste management at the local level.

Keyword: Waste Management; Women's Role; Sustainability; SWOT
JEL Classification: MM2

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INTRODUCTION

The issue of waste management in Indonesia is becoming increasingly urgent due to the growing volume of waste resulting from population growth and urbanization (Muktiningsih et al., 2023; Rahmawati and Wijayanti, 2024; Sudibyo et al., 2017). With a population of 250 million, Indonesia is the fourth most populous country in the world and the second largest contributor of plastic waste after China (Ratnawati et al., 2020). High consumption of plastics, such as packaging, bottles, and bags, without proper management exacerbates this problem, along with the growing population that increases waste production.

In 2024, data from the National Waste Management Information System (SIPSN) recorded that Indonesia produced around 19.5 million tons of waste per year. Of that amount, only 46.1% was properly managed. According to Sustainable Waste Indonesia in Webinar Series #4 Household Waste Management, 69% of waste is disposed of in landfills, 7% is recycled, and the remaining 24% is managed illegally, such as through burning, dumping, or polluting the sea (Kalpikawati and Pinaria, 2023). Poor waste management has the potential to pollute soil, water, and air, as well as increase greenhouse gas emissions (Government Regulation, 2021).

Effective waste management is crucial to supporting the achievement of the SDGs, particularly Goal 12 on responsible consumption and production, as well as Goal 3 on health and Goal 13 on climate action (Ayunda et al., 2020). Indonesia integrates the SDGs into national development through Presidential Regulation No. 59 of 2017, which emphasizes community-based waste management in the RPJMDes (Village Medium-Term Development Plan). This approach encourages villages to develop waste management strategies according to local conditions (Marlina, 2020).

Community-Based Waste Management (CBWM) is a strategic solution that emphasizes the active role of the community in the collection, sorting, and processing of waste (Ramadhanti, 2022). CBWM is based on the principles of independence, effectiveness, environmental protection, and program integration (Marlina, 2024). The success of this strategy requires collaboration between the government, the private sector, NGOs, and the community (Artamevia and Yuanjaya, 2024).

Various studies confirm the important role of women in waste management at various levels. Anggraini and Darmi (2023) found that women in Sido Mulyo Village, Bengkulu, are the main managers of domestic waste through sorting, recycling, and composting. Amalia et al. (2024) in Bojonegoro added that women also play a role in implementing the 6R principles (Rethink, Refuse, Reduce, Reuse, Rot, Recycle), from changing mindsets to recycling practices. Furthermore, women are active as agents of change in waste bank programs and recycling campaigns, as shown by Asteria and Haryanto (2021) in Jagakarsa, South Jakarta. Women play an important role in waste management in the community, especially as waste bank managers who oversee the administration and implementation of programs (Wayan et al., 2023). A study by Gatta et al. (2022) in Makassar shows that women also play a role as innovators who process waste into products of economic value, such as handicrafts and fertilizer. However, they face challenges such as double pressure, limited access to resources, and lack of recognition. To optimize this role, inclusive policies and infrastructure support in the form of training and empowerment are needed, which not only increase environmental awareness but also open up economic opportunities from the recycling process (Setyawati and Siswanto, 2020), while supporting the full and effective participation of women in line with SDG target number 5 on gender equality (Esquivel and Sweetman, 2016). In this context, the empowerment of women through access to natural resources is crucial to achieving equality and is an integral part of sustainable development (Agarwal, 2018). Therefore, strengthening the role of women in resource management must be a key focus in order to achieve inclusive and sustainable social transformation (Esquivel and Sweetman, 2016). The SWaCH case study in Pune, India, demonstrates the success of women's empowerment in waste management cooperatives. This initiative not only improves women's working conditions but also has a positive

impact on social inclusion and public health (Estrada et al., 2023). Similarly, in Indonesia, communities such as the Ngudi Makmur waste bank in Dusun Serut prove that women can be agents of change in environmental management and community empowerment (Nurazizah, 2021).

This study is based on the activities of the Student Organization Capacity Building Program (PPK Ormawa) of the Management Department Student Association, Faculty of Economics, Tidar University (HMJM FE Untidar). However, these activities have not achieved maximum results due to the limited empowerment period, which is only five months (Fitriana et al., 2024). Meanwhile, community empowerment is a continuous and non-instantaneous process (Afdhal et al., 2023). Based on this, in-depth research is needed on strategies to strengthen the role of women in sustainable waste management in Daleman Kidul Village. This study aims to optimize the role of women as key actors in waste management by analyzing human, environmental, and social aspects. The analysis uses a SWOT approach to identify the strengths, weaknesses, opportunities, and threats faced by women in the context of waste management. Thus, this study is expected to produce strategic recommendations that not only improve the effectiveness of waste management but also support environmental sustainability at the local level (Kartika and Harahap, 2023).

METHODS

This study uses a qualitative approach with a focus on the Nawasena Kemala Digital Waste House in Daleman Kidul Village, Pakis District, Magelang Regency. The selection of the research object was based on the findings of the 2024 PPK Ormawa HMJM FE Universitas Tidar activities, which showed the active role of women as village institutional administrators in environmental management, particularly community-based waste management. This village was chosen due to the urgency of waste management, which has increased along with population growth, and the need to empower women to support environmental independence and sustainability. This choice was also supported by a literature study related to government regulations, such as Magelang Regency Regulation Number 39 of 2018 concerning Regional Policies and Strategies for Household Waste and Household-like Waste Management.

The validity of the data in this study was obtained through in-depth interviews with women administrators to gain an accurate understanding of their experiences, challenges, and aspirations. Secondary data was obtained from official sources, scientific journals, and relevant literature to strengthen the research context. In addition, the validity and reliability of the data were strengthened by triangulation methods that combined various data sources (interviews with female administrators, village heads, and policy documents), data collection methods (in-depth interviews, participatory observation, and literature studies), and researcher triangulation (team discussions and analysis). This approach helps reduce bias, strengthen credibility, and ensure that the findings accurately reflect reality and are scientifically accountable (Susanto et al., 2023).

Data analysis was conducted using the IFE (Internal Factor Evaluation) Matrix to identify internal strengths and weaknesses, and the EFE (External Factor Evaluation) Matrix to identify external opportunities and threats. Furthermore, the interview results were analyzed to formulate policy recommendations that were not yet available. All analysis results were then formulated into a strategy for optimizing the role of women through SWOT Matrix analysis.

Identification of Vision and Mission

The vision of Rumah Sampah Digital Nawasena Kemala is to become an integrated, effective, economical, and sustainable digital waste management center to create a clean and healthy environment for Daleman Kidul Village. The institutional mission includes encouraging active community participation, increasing the economic value of waste through recycling, empowering local residents, and collaborating with various parties to support effective waste management.

Determination of the IE (Internal External) Matrix Approach Strategy Design

The determination of the strategy design using the IE matrix approach was carried out based on the results of the IFE and EFE matrix analysis. The assessment of the weight of 5 and the ranking on both matrices was carried out by the management of the Nawasena Kemala Digital Waste House located in Daleman Kidul Village, Pakis District, Magelang Regency.

Determining the SWOT Matrix Approach Strategy Design

The SWOT matrix is closely related to the IFE and EFE matrices because it provides an overview of the strengths and weaknesses of Rumah Sampah Digital Nawasena Kemala in facing existing opportunities and threats. This matrix is organized into four strategies, namely (1) SO (Strength Opportunity), (2) WO (Weakness-Opportunity), (3) ST (Strength-Threat), and (4) WT (Weakness-Threat).

Testing the Compatibility of the IE Matrix and SWOT Strategy

The compatibility between the IE matrix and SWOT is determined based on the suitability of the alternatives generated by each method. This process aims to determine the best strategy that can be proposed for the Nawasena Kemala Digital Waste House group in Daleman Kidul Village, Pakis District, Magelang Regency.

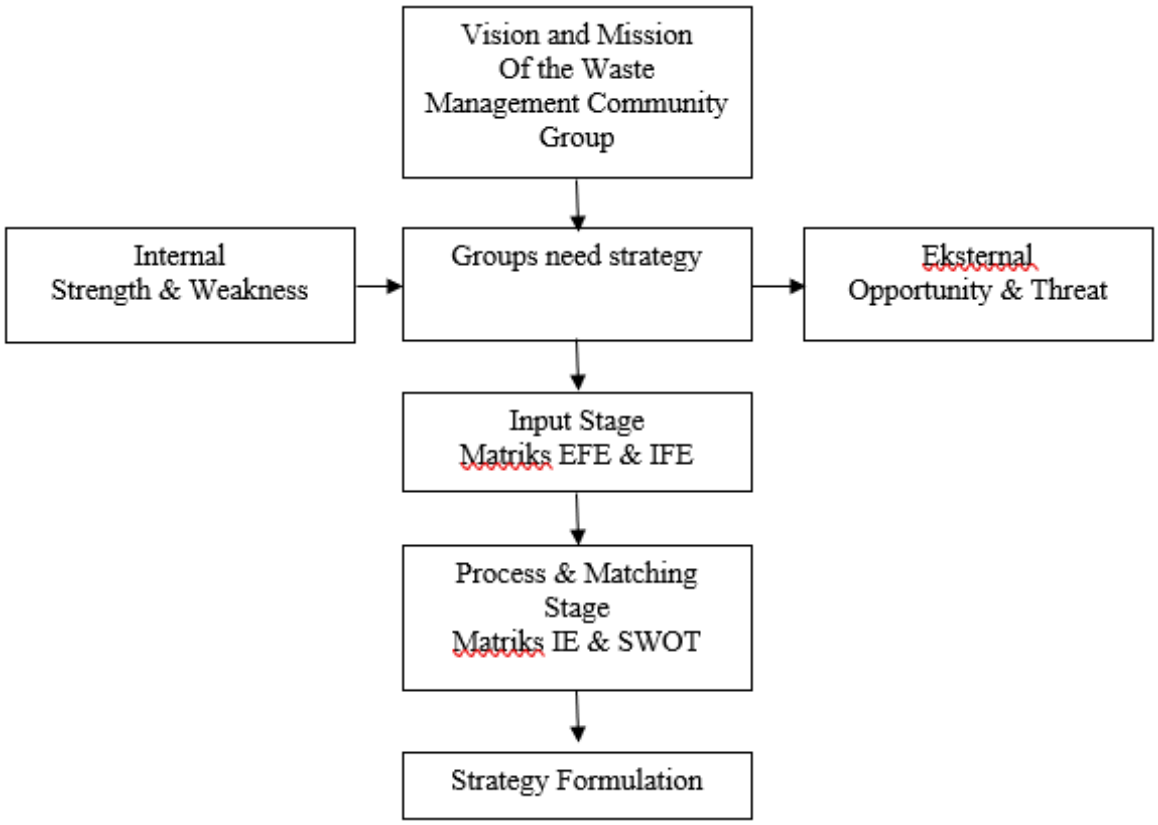


Figure 1. Conceptual Diagram

RESULT AND DISCUSSION

The matrix was compiled by the women administrators of Rumah Sampah Digital Nawasena Kemala and with contributions from the Head of Daleman Kidul Village, with assessments based on weights, rankings, and scores on SWOT indicators. The analysis shows that the main internal factor is the dominant role of women. Based on the matrix analysis that has been carried out, there are several key points that need to be highlighted from the internal and external factors that influence the implementation of the strategy, as follows:

1. Rumah Sampah Digital Nawasena Kemala is dominated by female administrators, especially housewives, who are active even though they only collect waste once a month. They have

succeeded in processing waste into 6 economically valuable products such as handicrafts, liquid organic fertilizer, and maggot cultivation, which provide economic benefits to the community.

2. The village government provides full support with policies and facilities to strengthen community empowerment. Collaboration with MSMEs and other waste banks expands the network and marketing. Synergy with the private sector for technology, but the use of digital waste management applications is still hampered by the limited skills of residents.
3. The main obstacles include low public awareness of waste sorting, slow decision-making due to the busy schedules of administrators, and a lack of incentives that could potentially reduce the motivation of administrators. Fluctuations in the price of inorganic waste and competition with conventional products also reduce interest in recycling. Nevertheless, good waste management has created a cleaner environment and encouraged community participation in maintaining sustainability.

Empowerment Strategy Comparison

Comparison of empowerment strategies in Daleman Kidul Village, Pakis Subdistrict with Kauman Hamlet, Muntilan Subdistrict. Daleman Kidul manages waste through the empowerment of women at the Nawasena Kemala Digital Waste House with clear SOPs, involving collection, sorting, and AWOR (processing organic waste) and HUNIK (processing inorganic waste) activities. This program is supported by the village government and collaboration with MSMEs. The economic impact is evident from waste management training and the marketing of recycled products. Waste management reduces waste accumulation, prevents pollution, and creates a clean and beautiful environment. Meanwhile, Kauman Hamlet manages waste through the Magelang Waste Donation Movement (GEMMA), which is based on social philanthropy without formal SOPs, relying on spiritual values and mutual cooperation to sort and donate waste that is processed collectively (Adiwirahayu et al., 2022). GEMMA reactivated social bonds after the pandemic, even though the institution was not yet formal. The community's mindset changed to become more caring and productive. It increased awareness of waste sorting, reduced waste to landfills, and produced liquid fertilizer that naturally fertilizes the soil. Both approaches show that waste management strategies that are appropriate to local conditions and appropriate empowerment can optimize social, economic, and environmental benefits in a sustainable manner.

IFE Matrix

The strengths and weaknesses of the waste management community group in Daleman Kidul Village can be seen from the Internal Factor Evaluation Matrix as follows:

Table 1. The Result of IFE Matrix

No	Internal Factors	Weight (0.01 – 1)	Rank Range (1 – 4)	Score (a x b)
Strength				
1	Dominated by female administrators.	0.06	2	0.12
2	Female administrators are more skilled and adept at waste sorting and hadicraft processing.	0.12	3	0.36
3	Produces liquid organic fertilizer.	0.04	1	0.04
4	Able to grow economic value through maggot farming.	0.04	1	0.04
5	Receiving support from the village government in the form of facilitie, infrastructure, and training facilities.	0.14	4	0.58

6	Collaborating with MSMEs and other village waste banks.	0.04	1	0.04
7	Has a digital waste application and training on how to use the application facilitated by the private sector.	0.06	2	0.12
Weakness				
1	Lack of skills among administrators in using digital waste applications.	0.05	1	0.05
2	Not optimal marketing of processed waste products.	0.10	2	0.2
3	No incentives for administrators.	0.20	4	0.8
4	Decision requires a long time for coordination.	0.15	3	0.45
Internal weighted value				2.80
Total Stength				1.30
Total Weakness				1.5
Interval				-0.20

EFE Matrix

The indicators of opportunities and threats faced by the waste management community in Daleman Kidul Village can be seen in the External Factor Evaluation Matrix as follows:

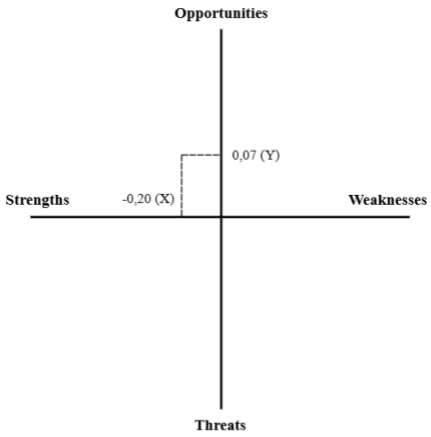
Table 2. The Result of EFE Matrix

No	External Factors	Weight (0.01 – 1)	Rank Range (1 – 4)	Score (a x b)
Opportunity				
1	Awareness among housewives to participate in managing waste banks.	0.15	4	0..60
2	The creation of a clean and beautiful environment.	0.05	1	0.05
3	Partnership in product marketing to increase the value and volume of sales of processed waste products.	0.10	3	0.30
4	Support from the private sector in training on the use of digital waste applications.	0.08	2	0.16
5	Government from in facilities, infrastructure, and policies.	0.12	3	0.36
Threat				
1	There are still residents who are not concerned about the importance of sorting and processing waste.	0.15	4	0.60
2	The selling price of collected inorganic waste, such as plastic and paper, often fluctuates.	0.10	2	0.20
3	The operation of waste banks still depends on external assistance and does not yet have a stable independent funding system.	0.05	2	0.10

4	Processed waste products face stiff competition from conventional products that are cheaper and easier to obtain.	0.10	3	0.3
5	Changing regulations related to waste management or reduced support from village governments	0.10	2	0.2
Internal weighted value				2.87
Total Opportunity				1.47
Total Threat				1.4
Interval				0.07

IE Matrix

The matching stage using the IE Matrix is related to the total interval or difference results from the IFE and EFE analyses that have been carried out, which are 0.20 for IFE and 0.07 for EFE.



Based on the position analysis that has been conducted, it can be concluded that Rumah Sampah Digital Nawasena Kemala, as a community group managing waste in Daleman Kidul Village, Pakis District, Magelang Regency, is in quadrant 3. This indicates that this position is very supportive of implementing strategic changes.

SWOT Matrix

The results of the SWOT analysis can produce strategies to be implemented in community-based waste management, with the analysis showing:

Table 3. The Result of SWOT Matrix

IFE	STRENGTHS (S)	WEAKNESSES (W)
	1. Dominated by female administrators 2. Female administrators are more skilled and agile in waste sorting, and handicraft processing 3. Produce liquid organic fertilizer 4. Able to increase economic value through maggot cultivation	1. Lack of skills in using digital applications to maximal for administrative activities 2. Suboptimal marketing of waste- processing products 3. Not any incentives for administrators

EFE	5. Receiving support facilities from the village government in the form of equipment, infrastructure, and training facilities 6. Collaborating with MSMEs and other village waste banks 7. Have a digital waste application and training on how to use the application facilitated by the private sector	4. Decision-making takes time long for coordination
OPPORTUNITIES (O) 1. Housewives' awareness to join in managing the waste bank 2. The creation of a that is clean and beautiful 3. Partnerships in product marketing to increase the value and volume of sales of processed waste products 4. Support from the private sector in training on the use of digital waste applications 5. Government support in facilities, infrastructure, and policies	SO STRATEGY: 1. Conducting regular skills training specifically for female administrators (S1, S2, O1). 2. Holding regular meetings with other waste banks and SMEs (S6, O2, O3).	WO STRATEGY: 1. Conducting training and learning about with the private sector (W1, O4). 2. Providing incentives for administrators (W3, O1, O5). 3. Conducting training on decisiveness in decision-making for all administrators (W4, O1).
THREATS (T) 1. There are still residents who are not concerned about the importance of sorting and processing waste 2. The selling price of collected inorganic waste, such as plastic and paper, often fluctuates 3. Operations still depend on external assistance and do not yet have a stable, independent funding system that is stable	STRATEGY ST: 1. Conducting education to the community to raise awareness about sorting and processing waste (S1, T1). 2. Creating more innovative waste- derived products (S2, T4).	WT STRATEGY: 1. Developing clear SOPs and granting authority to core management (W4, T5). 2. Collaborating with local governments and the private sector to create a more stable independent funding system (W3, T3).

4. Waste-derived products face competition from conventional products that are cheaper and more readily available. 5. Regulations related to waste management or reduced support from the village government		

Strategy Formulation

The following are strategic steps formulated to optimize the role of women in sustainable waste management.

1. Regularly hold skills training for women administrators to improve waste sorting techniques and public awareness. The development of certified training programs is also necessary to formally recognize women's technical skills.
2. Organize regular meetings with other village waste banks and MSMEs to share information and strengthen support networks.
3. Conduct joint digital application training with the private sector for efficient data management and administration.
4. Provide financial incentives or facilities to motivate active administrators.
5. Improve the decision-making system to make it faster and more effective.
6. Educate the community about the importance of sorting and processing waste to increase participation.
7. Develop innovative and competitive waste-derived products for the market.
8. Develop clear SOPs and give clear authority to core administrators for smooth operations.
9. Collaborate with the government and private sector to create a stable, independent funding system for program sustainability.

CONCLUSION

This study examines strategies for strengthening the role of women in sustainable waste management at the Nawasena Kemala Digital Waste House in Daleman Kidul Village, Pakis District, Magelang Regency, using a SWOT approach. The focus includes human resources, the environment, and social aspects. The main challenges faced are the high volume of daily waste, the limited number of skilled workers in waste management technology, and the low incentives for managers, the majority of whom are women. As a measure to overcome this, this study recommends regular training on the separation, processing, and marketing of recycled products, including the use of digital technology through collaboration with the private sector. The development of certified training programs is also necessary to formally recognize women's technical skills. In addition, partnerships with micro, small, and medium enterprises and the government must be established to create a sustainable financing system. Policy support in the form of consistent incentives and clear standard operating procedures is also important to increase the capacity of managers. In equal empowerment, gender integration must ensure fair access to training, resources, and opportunities for women.

With the implementation of this strategy, it is hoped that the role of women can be optimized not only in reducing waste but also in opening up economic opportunities and increasing public awareness of the importance of environmental sustainability. This study has limitations because it only focuses on one hamlet out of eight waste management hamlets in Daleman Kidul Village, so

the results are not representative. Therefore, to improve accuracy, future studies should expand the research area.

References

Adiwirahayu, A., Sakina, A.W., Marliyantoro, O., 2022. Inovasi pengelolaan sampah berbasis filantropi melalui gerakan sedekah sampah magelang (GEMMA). Madaniya. 3, 369–382.

Afdhal, Afriansyah, Mustanir, A., Ilmi, A., 2023. Pemberdayaan Masyarakat.

Agarwal, B., 2018. Gender equality, food security and the sustainable development goals. Elsevier. 34, 26–32.

Amalia, R., Pariasa, I.I., Putra, A.N., Siswantoro, A., 2024. Peran perempuan dalam penerapan pendekatan 6R untuk penurunan dan pengelolaan sampah rumah tangga. Jurnal Ilmu Lingkungan. 22, 1152–1158.

Anggraini, N., Darmi, T., 2023. Peran perempuan dalam penanganan sampah rumah tangga di kelurahan sido mulyo. Jurnal Ilmiah Multidisipin 1, 32–36.

Artamevia, V.D., Yuanjaya, P., 2024. Stakeholder engagement dalam pengelolaan sampah berbasis lokal: pengalaman dari desa panggungharjo. Journal of Public Policy and Administration Research. 2, 12.

Asteria, D., Haryanto, J.T., 2021. Empowerment key factors in shaping women's awareness of household waste management. Global Journal of Environmental Science and Management. 7, 1–14.

Ayunda, R., Disemadi, H.S., Wijaya, R., 2020. Kebijakan kawasan bebas gelandangan dan pengemis di kota batam: suatu kajian hukum perspektif sdgs. Jurnal Komunitas Yustisia Universitas Pendidikan Ganesha. 3.

Esquivel, V., Sweetman, C., 2016. Gender and the sustainable development goals. Gend Dev. 24, 1–8.

Estrada, M., Galvin, M., Maassen, A., Hörschelmann, K., 2023. Catalysing urban transformation through women's empowerment in cooperative waste management: the SWaCH initiative in Pune, India. Local Environ. 28, 852 866.

Fitriana, Y.R., Hapsari, S.N., Syakina, N., Kartiko, F., Jati, K., Hartono, B., Tidar, U., 2024. Pemberdayaan masyarakat desa daleman kidul melalui rumah sampah digital nawasena kemala.

Gatta, R., Anggraini, N., Asy'ari, M., Mallagennie, M., Moelier, D.D., Yahya, A.F., 2022. Transformasi peran dan kapasitas perempuan rumah tangga dalam pengelolaan sampah rumah tangga di kota makassar. Jurnal Penyuluhan. 18, 265–276.

Kalpikawati, I.A., Pinaria, N.W.C., 2023. Partisipasi masyarakat lokal dalam pengelolaan sampah berbasis sumber mendukung desa wisata berkelanjutan (studi kasus desa wisata taro, bali). Jurnal Ilmiah Pariwisata. 28, 50.

Kartika, S.D., Harahap, R.H., 2023. Peran ekofeminisme bagi perempuan dalam praktik daur ulang sampah bagi masyarakat. Indonesian Journal of Conservation. 12, 117–121.

Marlina, 2024. Pengelolaan sampah berbasis masyarakat untuk mendukung sdgs Tahun 2030 (Tujuan 11-Kota dan permukiman yang berkelanjutan) di Kota Makassar. Jurnal Penelitian Geografi (GeoJPG). 3, 111–120.

Marlina, A., 2020. Tata kelola sampah rumah tangga melalui pemberdayaan masyarakat dan desa di indonesia. JIP STKIP Kusuma Negara. 11.

Muktiningsih, S.D., Sekito, T., Dote, Y., 2023. Challenges and opportunities in community-based waste management: a case study from dadaprejo village, indonesia. Japan Society of Material Cycles and Waste Management (JSMCWM).

Nurazizah, A.M., 2021. Pemberdayaan perempuan melalui kegiatan bank sampah ngudi makmur dusun serut. Az-Zahra: Journal of Gender and Family Studies. 2, 1–10.

Peraturan Bupati (Perbup) Kabupaten Magelang, 2018. Nomor 39 Tahun 2018 tentang Kebijakan dan Strategi Daerah Pengelolaan Sampah Rumah Tangga dan Sampah Sejenis Sampah Rumah Tangga., Sekretariat Website JDIH. Kabupaten Magelang.

Peraturan Pemerintah (PP), 2021. No. 22 Tahun 2021 mengatur tentang Penyelenggaraan Perlindungan dan Pengelolaan Lingkungan Hidup, Pemerintah Republik Indonesia. Jakarta.

Peraturan Presiden, n.d. No. 59 Tahun 2017 tentang Pelaksanaan Pencapaian Tujuan Pembangunan Berkelanjutan (TPB), Sekretariat Kabinet Republik Indonesia. Jakarta.

Rahmawati, A.W., Wijayanti, Y., 2024. Faktor yang berhubungan dengan perilaku pengelolaan sampah. Indonesian Journal of Public Health and Nutrition. 4, 18–24.

Ramadhanti, F., 2022. Developing community-based solid waste management (CBSWM) model: case of west nusa tenggara, indonesia. Budapest International Research and Critics Institute-Journal (BIRCI-Journal).

Ratnawati, R.V., Tahar, N., Sidik, U.S., 2020. Kementerian lingkungan hidup dan kehutanan republik indonesia national plastic waste reduction strategic actions for indonesia. Ministry of Environment and Forestry, Republic of Indonesia.

Setyawati, E.Y., Siswanto, R.S.H.P., 2020. Partisipasi perempuan dalam pengelolaan sampah yang bernilai ekonomi dan berbasis kearifan lokal. Jambura Geo Education Journal. 1, 55–65.

Sudibyo, H., Pradana, Y.S., Budiman, A., Budhijanto, W., 2017. Municipal solid waste management in indonesia - a study about selection of proper solid waste reduction method in d.i. yogyakarta province. In: Energy Procedia. Elsevier Ltd, pp. 494–499.

Susanto, D., Jailani, Ms., Sulthan Thaha Saifuddin Jambi, U., 2023. Teknik Pemeriksaan Keabsahan Data Dalam Penelitian Ilmiah.

Wayan, E.S.N., Sulatra, I.K., Putra, I.K.S.A., Mahardika, K.W., 2023. Meningkatkan kesadaran siswa/i dalam pengolahan sampah organik dan non organik menjadi kerajinan tangan yang lebih bermanfaat. Jurnal Abdi Dharma Masyarakat (JADMA). 4, 150–155.