



Tangeran Village Community Empowerment in Sustainable Waste Management

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Abstract

Background: Waste management has become a critical environmental challenge in rural Indonesia due to population growth, changing consumption patterns, and limited local capacity to manage household waste sustainably. In Tangerang Village, inadequate waste handling practices have contributed to environmental degradation and reduced public health quality. Previous studies highlight that community empowerment, supported by education and participatory training, is essential to transform waste from an environmental burden into a valuable resource.

Aims: This community service program aimed to empower residents of Tangerang Village to adopt sustainable waste management practices through integrated education, technical training, and creative recycling activities.

Methods: The program employed a participatory approach involving initial surveys, environmental education, technical waste management training, waste bank socialization, and continuous monitoring and evaluation. Activities included composting demonstrations, recycling workshops, creative reuse initiatives, and community clean-up actions. Program effectiveness was assessed using a pretest–posttest design to measure changes in participants' understanding.

Result: The results showed a substantial improvement in participants' understanding of sustainable waste management, with mean scores increasing from 56.1 in the pretest to 83.8 in the posttest. Participants demonstrated enhanced awareness, practical skills, and positive attitudes toward waste sorting, recycling, and community-based waste management.

Conclusion: The program effectively translated empowerment principles into measurable environmental learning outcomes. The findings indicate strong potential for scaling community empowerment models to support sustainable waste management, environmental resilience, and socio-economic benefits in rural communities.

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INTRODUCTION

Waste management has emerged as one of the most pressing environmental challenges in Indonesia, driven by population growth, urbanisation, and changes in consumption patterns (Al Zahra & Shohibuddin, 2025; Frigo et al., 2025; Wikurendra et al., 2024). In rural areas, waste issues are often underestimated, despite their cumulative impact on environmental quality, public health, and social well-being. Inadequate waste handling practices, such as open dumping and uncontrolled burning, continue to dominate daily behaviour, leading to pollution and degradation of living environments. This condition highlights the urgency of community-based interventions that address waste problems at their source.

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From a broader environmental perspective, ineffective waste management contributes not only to local pollution but also to global ecological challenges, including climate change and ecosystem degradation. Previous studies have consistently shown that improper handling of organic and plastic waste accelerates soil contamination, water pollution, and the spread of disease (Chen et al., 2025; Siddiqua et al., 2022; Yang et al., 2025). Consequently, sustainable waste management has been widely recognised as an essential component of environmental protection and public health promotion, particularly within community settings.

The literature further emphasises that community empowerment plays a decisive role in achieving sustainable waste management (Afnan et al., 2025; Mulasari et al., 2024; Salsabila et al., 2023). Educational interventions, participatory training, and skill development initiatives have been shown to increase environmental awareness and foster long-term behavioural change. Approaches such as composting, waste banks, and creative recycling not only reduce waste volume but also create economic opportunities, thereby strengthening community resilience and social cohesion.

Despite the growing body of research on waste management, many programmes remain limited to awareness campaigns without sufficient follow-up or skill-based assistance (Etim, 2024; Kibria et al., 2023; Unegbu & Yawas, 2024). In rural contexts, this often results in short-lived behavioural change, as communities lack practical knowledge, technical guidance, and institutional support to sustain improved practices. This gap between knowledge dissemination and practical implementation continues to hinder the effectiveness of waste management initiatives.

Tangeran Village, located in Sruweng Subdistrict, Kebumen Regency, reflects these broader challenges. Although the village possesses strong social capital and local potential, waste management practices have not been optimally developed. Increasing household waste generation, combined with limited awareness and skills in waste sorting and processing, has contributed to environmental concerns within the village. These conditions underline the need for context-specific and participatory waste management programmes.

The gap analysis indicates that Tangerang Village requires more than informational campaigns; it needs sustained assistance that integrates education, hands-on training, and creative innovation. Without structured empowerment efforts, waste continues to be perceived as a burden rather than a resource with potential economic and environmental value. Addressing this gap requires an approach that actively involves residents as agents of change.

The rationale of this study is grounded in the belief that sustainable waste management can be achieved through participatory community empowerment. By combining environmental education, technical training, and creative recycling activities, communities can develop the capacity to manage waste independently while improving environmental quality and economic opportunities. This rationale aligns with the principles of sustainable development and community-based environmental governance. Accordingly, this community service programme was designed to empower the residents of Tangerang Village through a series of integrated activities, including waste awareness education, composting training, waste bank socialisation, and creative recycling workshops. These activities were intended to transform waste management practices from passive disposal into active resource utilisation.

The primary purpose of this study was to enhance community awareness, skills, and participation in sustainable waste management practices in Tangerang Village. It was expected that through structured guidance and participatory engagement, residents would adopt environmentally friendly behaviours, improve village cleanliness, and utilise waste as a resource with social and economic value. Ultimately, this programme sought to demonstrate that sustainable waste management is achievable when communities are empowered through appropriate, continuous, and human-centred assistance.

METHOD

To achieve the objectives of the community service program in Tangerang Village, a systematic and participatory methodological framework was adopted. The approach emphasized community empowerment, contextual relevance, and sustainability of outcomes. Each stage of the program was designed to ensure active resident involvement and mutual learning between the community and the service team. This methodological design aimed to transform waste management from a routine practice into a collective and value-oriented community activity. The implementation of the method

followed sequential stages that were interconnected and complementary. These stages included initial assessment, educational intervention, technical capacity building, institutional strengthening, and reflective evaluation. By integrating social, educational, and technical dimensions, the program sought to address waste management challenges comprehensively. The methodological flow ensured that interventions were responsive to local needs and adaptable to community dynamics.

Initial Survey and Observation

The program commenced with an initial survey and direct field observation to gain an in-depth understanding of environmental conditions in Tangerang Village. This stage focused on identifying prevailing waste management practices, household disposal habits, and residents' perceptions of environmental cleanliness. Interviews and structured questionnaires were administered to capture both qualitative insights and quantitative data. The information obtained served as a foundational reference for designing context-sensitive intervention strategies. In addition to data collection, observations enabled the team to recognize social patterns and community readiness for change. Attention was given to existing informal waste practices and the role of local actors in environmental activities. This process fostered early engagement and trust between the community service team and residents. Consequently, the survey stage ensured that subsequent activities were grounded in local realities rather than generic assumptions.

Education and Socialization

Educational and socialization activities were conducted to enhance residents' awareness of environmental and health issues related to waste mismanagement. The sessions addressed the ecological impacts of unmanaged waste, potential health risks, and the long-term benefits of sustainable waste practices. Information was delivered through interactive counseling, visual presentations, and guided discussions. This approach encouraged participants to actively reflect on their daily habits and environmental responsibilities. The socialization process targeted diverse community groups, including housewives, youth organizations, and community leaders. By involving multiple social segments, the program aimed to foster shared understanding and collective responsibility. Educational materials such as brochures and posters reinforced key messages and supported continuous learning. Through inclusive engagement, socialization activities strengthened community commitment to sustainable waste management initiatives.

Technical Waste Management Training

Technical training was provided to equip residents with practical skills in waste sorting and organic waste processing. Participants were trained to distinguish between organic and inorganic waste and to manage each category appropriately. Hands-on demonstrations were conducted to guide residents through compost production using household organic waste. This experiential learning approach enhanced skill acquisition and increased participant confidence. The training sessions emphasized the practical benefits of composting, including soil fertility improvement and waste volume reduction. Residents were encouraged to apply the techniques directly within their households and shared spaces. Trainers provided continuous guidance and addressed challenges encountered during practice. As a result, technical training transformed theoretical knowledge into applicable and sustainable waste management practices.

Waste Bank Socialization

To ensure sustainability, the concept of a waste bank was introduced as an institutional mechanism for managing recyclable waste. The waste bank model was explained as a system for collecting, sorting, and storing valuable inorganic materials such as plastic, paper, and metal. Residents were informed about the economic and environmental advantages of participating in waste bank activities. This initiative aimed to reposition waste as a resource rather than a burden. Socialization activities highlighted operational procedures, roles, and potential economic returns of the waste bank. Community members were encouraged to participate collectively and establish local management structures. The introduction of the waste bank fostered a sense of ownership and accountability among residents. Ultimately, this component strengthened the economic dimension of sustainable waste management within the village.

Monitoring and Evaluation

Monitoring and evaluation were conducted to assess the effectiveness and progress of the community service program. Regular visits and observations were carried out to examine how residents applied newly acquired knowledge and skills. Evaluation focused on behavioral changes, environmental cleanliness, and consistency of waste management practices. This stage provided empirical feedback on program implementation and outcomes. In addition to outcome assessment, evaluation served as a reflective process for continuous improvement. Community feedback was collected to identify challenges and areas requiring further assistance. The findings informed recommendations for future interventions and potential program replication. Through systematic monitoring and evaluation, the program ensured accountability, learning, and long-term impact sustainability.

RESULTS AND DISCUSSION

Results

As an initial step in evaluating program effectiveness, participants' understanding of empowerment in sustainable waste management was assessed using a pretest–posttest design. The assessment measured participants' awareness of waste sorting, recycling, composting, and the collective role of communities in managing waste sustainably. This evaluation was conducted prior to and following the educational and training activities to capture changes in knowledge and comprehension attributable to the program.

Table 1. Individual Pretest–Posttest Scores of Participants' Understanding

Participant	Pretest Score	Post-test Score
Participant 1	55	82
Participant 2	58	85
Participant 3	52	80
Participant 4	60	88
Participant 5	57	84
Participant 6	54	81
Participant 7	56	83
Participant 8	59	86
Participant 9	53	80
Participant 10	55	82
Participant 11	58	85
Participant 12	54	81

Source: Primary data

The [Figure 1](#) illustrates a clear increase in the mean understanding score from 56.1 (pretest) to 83.8 (posttest), with thin capped bars representing score variability among participants.

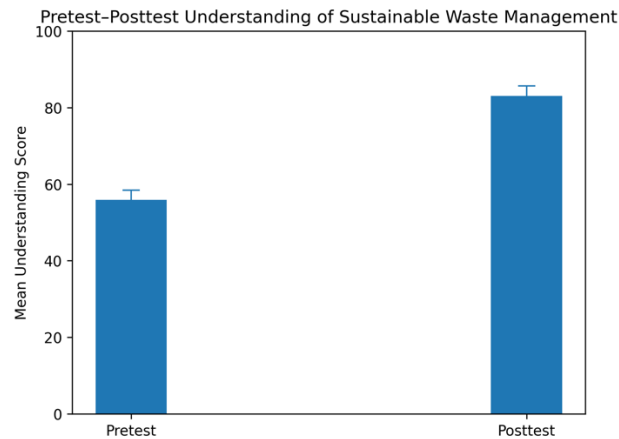


Figure 1. Mean Pretest–Posttest Understanding of Sustainable Waste Management

The results indicate a substantial improvement in participants' understanding following the empowerment-based training. Prior to the intervention, participants demonstrated limited conceptualisation of waste as a resource and tended to associate waste management solely with disposal activities. After the program, participants exhibited stronger comprehension of sustainable waste management principles, including waste segregation, recycling practices, and the economic and environmental value of waste processing. The relatively consistent posttest scores suggest that the participatory and hands-on approach was effective across participants with diverse educational and social backgrounds. Educational sessions combined with practical demonstrations enabled participants to translate abstract environmental concepts into concrete, applicable practices within their daily lives.

Synthesising these findings, the pretest–posttest improvement confirms that community empowerment interventions play a critical role in strengthening public understanding of sustainable waste management. The program successfully transformed awareness into actionable knowledge, reinforcing the importance of education, participation, and skill development in driving behavioural change. These results provide a strong empirical foundation for subsequent program activities and support the broader objective of fostering environmentally responsible and economically empowered rural communities.

The implementation of the community service programme in Tangerang Village, Sruweng District, was carried out through several sequential activities aimed at empowering the local community in waste management. The awareness programme on waste and environmental issues was conducted at SD Negeri 1 and SD Negeri 2 Tangerang, targeting students in grades 4–6. The programme ran smoothly and provided tangible benefits to the participants, particularly in enhancing their awareness of the importance of cleanliness and proper waste management. The primary objective was to reduce the volume of waste within the school environment and promote more effective waste management practices (Figure 2).



Figure 2. Implementation of Waste and Environmental Awareness Programme

In order to encourage active community participation in maintaining cleanliness and environmental preservation, the community service team collaborated with various local parties to

initiate environmental clean-up activities. These activities aimed to create a cleaner, healthier, and more comfortable village atmosphere, while also fostering residents' awareness that maintaining cleanliness is an essential part of daily life (Figure 3).



Figure 3. Implementation of Environmental Service Programme

As part of the efforts to empower the community in managing plastic waste and utilising it for economic and environmental purposes, the UMNU Tangerang Village team initiated workshops and training sessions on making paving blocks and ecobricks. This programme, one of the flagship activities, aimed to teach residents how to process plastic waste into useful products with economic value. Poor management of plastic waste is one of the primary causes of environmental pollution in Tangerang Village. Through this training, the community is expected to be able to process plastic waste creatively into functional and economically valuable products, thereby helping to reduce environmental pollution (Figure 4).



Figure 4. Implementation of Workshops and Training

As a form of innovation and creativity, the community service team also implemented a programme to create costumes from plastic waste for use in the village carnival. This initiative aimed not only to reduce plastic waste but also to demonstrate that discarded materials can be transformed into unique and aesthetically valuable artworks.

The carnival, held to celebrate the 79th Indonesian Independence Day in Tangerang Village, provided an opportunity to showcase the results of the recycled costume creations to the wider community. This programme offered residents hands-on experience in waste management while also encouraging them to think creatively in producing attractive items from recycled materials (Figure 5).



Figure 5. Making Recycled Costumes

Discussion

The findings of this study demonstrate that community empowerment is a fundamental driver of sustainable waste management practices in rural settings. The significant improvement in participants' pretest–posttest scores confirms that education combined with practical training can effectively enhance environmental knowledge and awareness. This outcome aligns with empowerment theory, which emphasises that knowledge acquisition must be accompanied by skill development and participatory engagement to produce lasting behavioural change (Harinurdin et al., 2025; Lansing et al., 2023). Residents gradually shifted their perception of waste from a mere disposal problem to a manageable resource with environmental and economic value. Such cognitive and attitudinal transformation represents a crucial foundation for sustainable environmental behaviour.

The participatory approach adopted in this programme proved effective in fostering community ownership and responsibility. By involving residents directly in waste sorting, composting, and recycling activities, the programme enabled experiential learning rather than passive information reception. Previous studies have shown that participatory waste management initiatives generate stronger commitment and long-term adoption compared to top-down interventions (Aristizábal Cuellar et al., 2025; Pambudi et al., 2025). The active involvement of various community groups, including women and youth, strengthened social cohesion and collective accountability. This inclusive engagement reinforced the idea that sustainable waste management is a shared social responsibility.

Technical waste management training emerged as a critical component in translating awareness into action. Practical demonstrations of composting and waste processing allowed residents to immediately apply newly acquired skills in their daily lives (Ozanne et al., 2022; Wijastuti et al., 2025). This finding supports prior research indicating that hands-on environmental training enhances self-efficacy and reduces resistance to behavioural change. Participants reported increased confidence in managing household waste independently. Consequently, technical capacity building functioned as a catalyst for sustained practice rather than short-term compliance.

The introduction of the waste bank concept further strengthened the sustainability dimension of the programme. By associating waste management with potential economic benefits, residents became more motivated to consistently sort and collect recyclable materials. This approach aligns with the circular economy framework, which promotes resource efficiency and waste valorisation (Islam et al., 2024). The waste bank also served as a social institution that encouraged cooperation, transparency, and mutual trust among community members. As a result, environmental and economic objectives were addressed simultaneously.

Creative recycling activities, such as producing ecobricks, paving blocks, and recycled costumes, played an important role in reinforcing behavioural change. These activities demonstrated

that waste can be transformed into products with aesthetic and functional value, challenging the stigma attached to discarded materials. The integration of creativity and cultural events, including village carnivals, enhanced community enthusiasm and visibility of programme outcomes. Such innovative practices are consistent with literature highlighting the role of creativity in sustaining environmental engagement. This dimension contributed to both environmental improvement and community pride.

Environmental clean-up activities further strengthened collective awareness and reinforced positive behaviour. Joint clean-up initiatives provided visible evidence of environmental improvement, reinforcing the benefits of collective action. According to social learning theory, observable positive outcomes increase the likelihood of behaviour repetition (Lind et al., 2019). Residents reported heightened motivation to maintain cleanliness after witnessing tangible improvements in their surroundings. These activities thus functioned as both symbolic and practical reinforcement of sustainable practices.

Overall, the discussion confirms that sustainable waste management in rural communities requires an integrated approach combining education, technical training, institutional support, and creativity. The Tangerang Village programme demonstrates that empowerment-based interventions can effectively bridge the gap between environmental knowledge and practice. Behavioural change was achieved not through coercion, but through continuous guidance, participation, and mutual learning. These findings strengthen the argument that community empowerment is a viable pathway toward long-term environmental sustainability. The programme's success underscores the importance of contextualised and human-centred environmental interventions.

Implications

The findings imply that sustainable waste management initiatives in rural areas should prioritise community empowerment rather than solely focusing on infrastructure provision. Education, participatory training, and creative engagement significantly enhance residents' willingness and capacity to adopt environmentally responsible behaviours. These implications suggest that policymakers and practitioners should integrate empowerment-based approaches into local environmental governance strategies. Such approaches can simultaneously improve environmental quality, social cohesion, and economic resilience at the community level.

Contribution of Community Service

This community service programme contributes meaningfully to environmental sustainability by strengthening community knowledge, skills, and participation in waste management. The programme successfully transformed waste management from an individual household concern into a collective community practice. By integrating education, technical assistance, and creative innovation, the initiative demonstrated the practical role of higher education institutions in supporting grassroots environmental change. Moreover, it reinforced community confidence and encouraged local innovation in addressing environmental challenges.

Limitations

Despite its positive outcomes, this programme has several limitations. The implementation was limited to a single village, which may restrict the generalisability of the findings to other contexts. The evaluation primarily focused on short-term knowledge and behavioural changes, without long-term monitoring of practice sustainability. Additionally, variations in participants' educational backgrounds and available resources may have influenced the pace and consistency of implementation.

Suggestions

Future programmes are recommended to expand implementation across multiple villages to enhance comparative analysis and scalability. Longitudinal evaluation should be incorporated to assess the durability of behavioural change and institutional sustainability. Collaboration with local governments and environmental agencies could strengthen policy integration and resource support. Furthermore, integrating digital monitoring tools may enhance data tracking and programme

efficiency. Through these improvements, community empowerment initiatives can achieve broader and more sustainable environmental impact.

CONCLUSION

This community service program was initiated in response to the urgent need, as articulated in the Introduction, to address persistent waste management challenges in Tangerang Village through participatory and empowerment-based approaches. As expected, the results and discussion demonstrate that integrating environmental education, technical training, and creative innovation effectively translated initial awareness gaps into measurable improvements in knowledge, skills, and community engagement. The significant increase in participants' pretest–posttest scores confirms that empowerment-oriented interventions can bridge the gap between environmental understanding and sustainable practice.

The findings further reveal that community involvement in composting, waste banking, recycling workshops, and creative reuse activities fostered positive behavioural change and strengthened collective responsibility. These outcomes validate the premise that sustainable waste management is not merely a technical issue, but a social process that requires continuous guidance, participation, and contextual adaptation. Importantly, the program also generated added value by opening economic opportunities and enhancing community pride through creative and culturally embedded activities.

Looking ahead, the results offer promising prospects for the development and broader application of similar empowerment models in other rural contexts. Future initiatives may expand geographic coverage, incorporate longitudinal monitoring to assess sustainability, and integrate digital tools to enhance efficiency and data management. Overall, this program affirms that human-centered community empowerment is a viable and scalable pathway toward sustainable waste management, environmental resilience, and improved quality of life in rural communities.

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AUTHOR CONTRIBUTION STATEMENT

AM conceptualized and designed the community service program, led field implementation, coordinated community engagement activities, and drafted the original manuscript. AS contributed to methodological planning, facilitated educational and training sessions, and supported monitoring and evaluation processes. IF assisted in data collection, documentation of program activities, and organization of waste management training and creative recycling initiatives. SF supported community coordination, assisted technical implementation at the village level, and contributed to manuscript review and refinement. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

REFERENCES

- Afnan, D., Wijaya, M., Kartono, D. T., & Wibowo, A. (2025). Community empowerment model in the refuse-derived fuel waste management program in Indonesia. *Cleaner Waste Systems*, 12, 100364. <https://doi.org/10.1016/j.clwas.2025.100364>
- Al Zahra, P., & Shohibuddin, M. (2025). A Community-Driven Approach to Urban Waste Management: Insights from the Kenanga Waste Bank, Bogor, Indonesia. *Society*, 13(1), 306–327. <https://doi.org/10.33019/society.v13i1.786>
- Aristizábal Cuellar, J. A., Puerto-Rojas, E., Correa-Galindo, S. N., & Sierra Puentes, M. C. (2025). A Community-Based Intervention Proposal for Municipal Solid Waste Management: Analyzing

- Willingness, Barriers and Spatial Strategies. *Sustainability*, 17(13), 6206. <https://doi.org/10.3390/su17136206>
- Chen, Z., Carter, L. J., Banwart, S. A., & Kay, P. (2025). Microplastics in Soil–Plant Systems: Current Knowledge, Research Gaps, and Future Directions for Agricultural Sustainability. *Agronomy*, 15(7), 1519. <https://doi.org/10.3390/agronomy15071519>
- Etim, E. (2024). Leveraging public awareness and behavioural change for entrepreneurial waste management. *Heliyon*, 10(21), e40063. <https://doi.org/10.1016/j.heliyon.2024.e40063>
- Frijo, G., Zurbrugg, C., Juwana, I., & Binder, C. R. (2025). Where does plastic waste go? Local dynamics of waste flows in Indonesian neighbourhoods. *Environmental Challenges*, 19, 101135. <https://doi.org/10.1016/j.envc.2025.101135>
- Harinurdin, E., Laksmono, B. S., Kusumastuti, R., & Safitri, K. A. (2025). Community Empowerment Utilizing Open Innovation as a Sustainable Village-Owned Enterprise Strategy in Indonesia: A Systematic Literature Review. *Sustainability*, 17(8), 3394. <https://doi.org/10.3390/su17083394>
- Islam, N. F., Gogoi, B., Saikia, R., Yousaf, B., Narayan, M., & Sarma, H. (2024). Encouraging circular economy and sustainable environmental practices by addressing waste management and biomass energy production. *Regional Sustainability*, 5(4), 100174. <https://doi.org/10.1016/j.regsus.2024.100174>
- Kibria, Md. G., Masuk, N. I., Safayet, R., Nguyen, H. Q., & Mourshed, M. (2023). Plastic Waste: Challenges and Opportunities to Mitigate Pollution and Effective Management. *International Journal of Environmental Research*, 17(1), 20. <https://doi.org/10.1007/s41742-023-00507-z>
- Lansing, A. E., Romero, N. J., Siantz, E., Silva, V., Center, K., Casteel, D., & Gilmer, T. (2023). Building trust: Leadership reflections on community empowerment and engagement in a large urban initiative. *BMC Public Health*, 23(1), 1252. <https://doi.org/10.1186/s12889-023-15860-z>
- Lind, J., Ghirlanda, S., & Enquist, M. (2019). Social learning through associative processes: a computational theory. *Royal Society Open Science*, 6(3), 181777. <https://doi.org/10.1098/rsos.181777>
- Mulasari, S. A., Husodo, A. H., Sulistyawati, S., Sukesu, T. W., & Tentama, F. (2024). Community-driven Waste Management: Insights from an Action Research Trial in Yogyakarta, Indonesia. *The Open Public Health Journal*, 17(1). <https://doi.org/10.2174/0118749445334410241122102430>
- Ozanne, L. K., Ballantine, P. W., & McMaster, A. (2022). Understanding Food Waste Produced by University Students: A Social Practice Approach. *Sustainability*, 14(17), 10653. <https://doi.org/10.3390/su141710653>
- Pambudi, N. F., Simatupang, T. M., Samarakoon, S. M. K., Mulyono, N. B., Ratnayake, R. M. C., & Okdinawati, L. (2025). Enhancing public participation in plastic waste management for a sustainable circular economy: insights from Indonesia. *Journal of Material Cycles and Waste Management*, 27(5), 3366–3389. <https://doi.org/10.1007/s10163-025-02294-5>
- Salsabila, L., Teovani Lodan, K., & Khairina, E. (2023). Public Engagement Impact on Sustainable Waste Management in Indonesia: Examining Public Behavior. *Jurnal Administrasi Publik Public Administration Journal*, 13(2), 158–178. <https://doi.org/10.31289/jap.v13i2.10391>
- Siddiqua, A., Hahladakis, J. N., & Al-Attiya, W. A. K. A. (2022). An overview of the environmental pollution and health effects associated with waste landfilling and open dumping. *Environmental Science and Pollution Research*, 29(39), 58514–58536. <https://doi.org/10.1007/s11356-022-21578-z>
- Unegbu, H. C. O., & Yawas, D. S. (2024). Optimizing construction and demolition waste management in Nigeria: challenges, regulatory frameworks, and policy solutions. *Discover Civil Engineering*, 1(1), 141. <https://doi.org/10.1007/s44290-024-00142-3>
- Wijiastuti, A., Nugroho, D. O. W., & Pamuji, P. (2025). Composter: Creative Solutions to Fostering Life Skills of Students with Intellectual Disabilities Towards Golden Indonesia 2045 (pp. 274–289). https://doi.org/10.2991/978-2-38476-489-1_22
- Wikurendra, E. A., Csonka, A., Nagy, I., & Nurika, G. (2024). Urbanization and Benefit of Integration Circular Economy into Waste Management in Indonesia: A Review. *Circular Economy and Sustainability*, 4(2), 1219–1248. <https://doi.org/10.1007/s43615-024-00346-w>

Yang, Y., Lü, F., Zhang, H., & He, P. (2025). Evolution and associated environmental pollution risks of micro- and nanoplastics through landfill processes. *Emerging Contaminants*, 11(4), 100593. <https://doi.org/10.1016/j.emcon.2025.100593>