

Community Empowerment At The Akehuda Digital Waste House To Support Circular Economy Activities In Ternate City

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Abstract.

Accumulation of waste can cause environmental quality to decline, the emergence of unpleasant odors and pollution of land and water. Apart from that, plastic waste that is not thrown away in the trash can cause it to be thrown into the sea, as it happens in the sea surrounding Ternate Island. The waste management system must be carried out comprehensively, among the central government, regional government and the community, for example by establishing a digital waste house based on community empowerment activities. The aim of this activity is to improve community behavior in sorting waste at the household level so that the volume of waste reaching the landfill is reduced. Apart from that, it can increase people's knowledge and skills in managing waste businesses through the establishment of digital-based waste houses. The next goal is to improve community skills in processing inorganic waste and plastic waste as well as processing organic waste into compost fertilizer and various ecoenzyme derivative products. It is hoped that the results of the activity can initiate the formation of community entrepreneurship based on processed waste products to support circular economic activities. Activities were carried out from July to September 2023 located in Akehuda Village, Ternate City. The implementation method was socialization of waste management through counseling and at the same time assistance in processing waste. Apart from that, community empowerment was carried out by establishing a digital-based waste house. The results of the activity show that the partners already have a digital-based waste house, partner members were able to manage the waste processing business from the Marasai digital waste house, partner members have the knowledge and skills to process waste. In order to increase public interest and participation in processing waste, it is necessary to continue to carry out socialization about waste processing.

Keywords: Circular economy, community empowerment and recycle waste.

I. INTRODUCTION

The circular economy concept has been introduced by several countries starting in 2008 (Dhewanto et al., 2018). A simple circular economy model is to process waste better and more profitably by recycling, so that waste produced by humans still provides economic benefits (Subekti, 2023). Waste is objects or leftover items that are no longer needed and must be thrown away (Zulfa and Nugraheni, 2020; Apriliana et al., 2022). The waste problem is still a serious problem globally today, including in Indonesia (Sudrajad et al., 2022). The results of field observations shown that in almost all areas of Ternate City, there were piles of rubbish which indicate that there was no waste sorting from households as shown in Figure 1. The accumulation of waste exceeding the capacity of the waste storage can be caused by the inability of the waste shredder every day to reduce waste, including waste originating from households (Solati, 2019). Almost all regions in Indonesia face the problem of piling up waste (Adiatmika, 2022), including in Ternate City. Accumulation of waste can cause environmental quality to decline, for example the emergence of unpleasant odors and soil and water pollution (Luthfiani and Atmanti, 2021). Apart from that, plastic waste that is not thrown away in the trash can cause it to be thrown into the sea (Northcott, 2020), as is what happens in the sea surrounding Ternate Island. Plastic waste thrown into the sea can disrupt marine ecosystems. The research results report that plastic in the sea will decompose into microplastics which can be eaten by fish and when humans consume fish, these microplastics can be absorbed by humans (Aulia et al., 2023).

The waste management system must be carried out comprehensively, among the central government, regional government and the community, for example by establishing a waste bank (Sudrajad et al., 2022).

The Ministry of Environment and Forestry RI issued Ministerial Regulation (Permen LHK) No. 14/2021 concerning waste bank management, which is a facility for managing waste using the 3R principles (reduce, reuse and recycle), as a means of education, behavior change in waste management and implementation (Satispi and Samudra, 2022). Waste banks can be a medium for implementing circular economy practices, which is formed and managed by communities, business entities and local governments (Guman and Wegner-Kozlova, 2020); Pratama et al., 2020). The requirements that must be met by waste banks are waste management, waste bank facilities and waste bank governance. It is hoped that the existence of a waste bank or digital waste house can be a solution for controlling waste in a sub-district which can also improve the community's economy. On the other hand, in the current digital era, every aspect of life can always be connected to information and communication technology systems, including in aspects of waste management. In Akehuda Village, Ternate City, a conventional waste bank had previously been formed which still had many shortcomings in its management. The waste bank was still managed manually so it requires a lot of record keeping and there is a possibility of unilateral errors. Likewise, activities at waste banks are still limited to waste buying and selling transactions only. Based on the results of observations and interviews with the waste bank administrators in Akehuda Village, the UMMU Law Faculty of the Students Executive Board will provide community empowerment assistance in processing waste in Akehuda Village, Ternate City.



Fig 1. Several waste accumulation points in Ternate City indicate that waste has not been sorted at the household level (Documentation from the UMMU Law Faculty of the Students Executive Board, taken between the end of February

II. METHODS OF IMPLEMENTATION

Based on the results of observations at the activity location and several problems found, an implementation method was developed to be applied to this activity, including through lectures and discussions, mentoring and training and practice, as described in the table below:

Table 1. Several community problems in waste management in Akehuda Village, Ternate City

No.	Waste management problems	Problems solution	Implementation method	Targets to be achieved
1.	Household waste was not sorted before being thrown into the rubbish bin, so the volume of waste continues to increase (Problem 1)	Providing awareness and understanding as well as skills for sorting waste at the household level	Lectures and discussions, practice sorting waste	Public behavior/awareness of sorting waste has increased
2.	The management of waste house in Akehuda Village was carried out conventionally, so that records for customers may be wrong (Problem 2)	Establishment of a digital-based waste house	Assistance and training in using the digital waste house	One digital waste house was formed in the Akehuda Village
3.	There was still a lack of public knowledge and attention to processing anorganic waste, such as plastic which can still be recycled, apart from saving it in rubbish houses, so that the volume of waste does	Providing outreach and assistance to partner communities to be able to recycle plastic into various ecobricks	Lectures and discussions, practice/mentoring	The volume of plastic waste can be reduced to landfills

	not decrease significantly (Problem 3)	products		
4.	The knowledge and skills of the community/partners are still lacking in processing waste, especially wet waste, into various useful products (Problem 4)	Providing outreach and assistance to partner communities to be able to utilize wet/organic waste to become ecoenzyme derivatives	Lectures and discussions, practice/mentoring	The volume of wet waste can be reduced to landfills
5.	Public knowledge about the circular economy to utilize waste as a business opportunity was still very lacking (Problem 5)	Carry out continuous outreach so that public awareness increases in processing waste	Lectures and discussions	Public knowledge about the benefits of using waste into business products

This activity is part of the Student Organization Capacity Strengthening Program 2023 (Program Penguatan Kapasitas Organisasi Mahasiswa 2023) which is based on community empowerment. The activity was carried out from July to September 2023. The partners involved were the community in Akehuda Village, Ternate City. The method of implementing the activity is socialization by providing education about waste management, especially at the household level. The socialization material was to introduce waste management using the 3R concept, namely reuse, reduce and recycle. Apart from that, assistance was provided for improving waste processing skills through assistance and practice in making leftover organic waste in households. Training was also carried out to provide training on how to convert organic waste in households into various ecoenzyme derivative products such as soap and organic fertilizer. Furthermore, to empower the community by improving their economy, waste management was carried out by establishing a digital waste house by utilizing current technological advances, namely internet based.

III. RESULT AND DISCUSSION

According to the Republic of Indonesia Minister of Environment Regulation No. 13/2012 (Farizal et al., 2017; Fikri, Hafidh and Sirajuddin, 2023), a waste bank is a place for sorting and collecting waste that can be recycled and reused so it has economic value. Based on its function and role, the term waste bank can also refer to the term digital waste house. The initial initiation activity for the establishment of the Marasai digital waste house aims to be a strategy to build caring and friendly behavior towards waste to gain economic benefits. The activity began by holding discussions with the Head of the Akehuda Village to identify waste management problems in the Akehuda, so that several waste problems were compiled as shown in Table 1. Next, a coordination meeting was held among the team of students, supervisors, dean and lecturers at the Faculty of Law, Muhammadiyah University, North Maluku, which was documented in Figures 1A and 1B



Fig 1. Coordination meeting and direction from the Dean of the UMMU Law Faculty (A), and coordination with Akehuda Village Head (B)

The activities that have been carried out for three months (July-September 2023) are described as follows:

1. Knowledge and skills in processing waste at the household level

One of the burdens of handling waste is waste production at the household level (Farizal et al., 2017). This is made worse by the lack of waste sorting by households before the waste is thrown into waste collection stations. For this reason, in this activity community members were given knowledge on how to properly sort waste. Before disposing of waste, it is necessary to separate the waste based on the character of

the waste, for example organic waste and inorganic waste. Organic waste, for example from food processing, fruit peels and vegetable waste, can be reused as raw material for making ecoenzymes or organic fertilizer, while inorganic waste, for example plastic, can be deposited in waste houses for sale or can also be reused by making ecobrick products.



Fig 2. Providing materials on how to sort household waste (A), and documentation of the work team and Akehuda Village officials (B)

2. Knowledge and skills in processing plastic waste into various ecobrick products



Fig 3. The team work students and the community make ecobrick into flower pots

In simple terms, ecobricks are the use of waste, especially plastic bottles, which are filled densely with plastic waste. Ecobrick comes from the words eco and brick which means environmentally friendly brick. Ecobrick products are a creative effort to handle plastic waste (Widiyasari, Zulftria, and Fakhirah, 2021). In this activity, the community was given knowledge about ecobricks and several useful items that can be produced from plastic bottles into ecobrick products. Teams of students and the community together made ecobrick flower pots, as seen in Figure 3.

3. Knowledge and skills in processing organic waste into eco-enzymes and eco-enzyme derivatives such as soap and organic fertilizer



Fig 4. Coordination with the eco-enzyme community (A) and training to make soap from the eco-enzyme community (B)

Apart from knowledge of how to sort waste, the community were also taught to process household waste, especially wet waste or organic waste, into useful products, for example by providing skills in making bath soap and detergent soap and organic fertilizer. The training activity for making soap from organic waste is documented as in Figure 4.

4. Creation of the Marasai digital waste house website in Akehuda Village, Ternate City

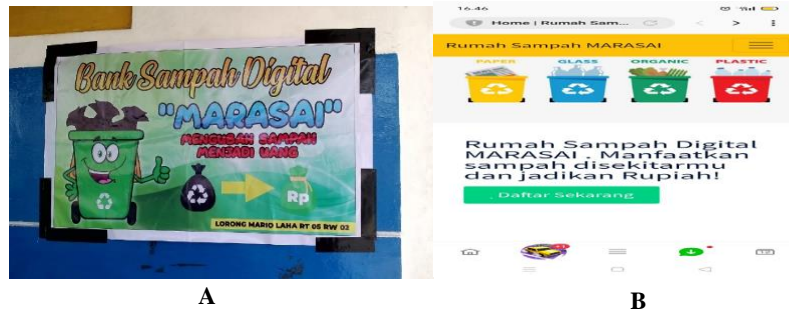


Fig 5. Akehuda trash house signboard (A), and appearance of the Marasai Trash House website, Akehuda Village (B)

In order to help communities in Akehuda Village manage digital-based waste houses as an initial initiation to building a circular economy business, the student team helped by preparing a website. The website is designed to make it easier for partners to administer waste management. The trash house that was built was called the Marasai Trash House in Akehuda Village, Ternate City. The website contains a menu that can be accessed by both the public and the waste house manager. Marasai waste house business premises and website as shown in Figure 5.

5. Assistance for prospective entrepreneurs based on waste processing at the Marasai waste house, Akehuda District Village



Fig 6. Inauguration of the Akehuda waste house by representatives of the Ternate City Government, attended by the supervisors of the Students Executive Board of Law Faculty UMMU

The next activity was to provide assistance to the administrators of the Marasai digital waste house. The establishment of the waste house has been inaugurated by the Head of Akehuda Village, as in Figure 6. The training provided to run a waste management-based business in connecting with a circular economy. The training material was how to access and to use the Marasai digital waste house website. Waste management is also a problem that has not been handled properly until today (Eka et al., 2023). There are many ways and strategies that have been tried to overcome the waste problem. The role of the entire community is also needed to work together to reduce waste.

IV. CONCLUSION

Waste management requires cooperation from all parties, including cooperation between academic groups, the community and local government. Student organizations can also play an active role in overcoming waste problems. If waste is managed, it can become a family economic resource through circular economic activities. For this reason, it is recommended that partners need to be given further assistance regarding entrepreneurship-based waste processing. Another suggestion is that there needs to be continued outreach and assistance to increase public interest and participation in waste management, especially in managing waste in digital waste houses.

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REFERENCES

- [1] Adiatmika IWW, Nain U. 2022. Community Empowerment in Waste Management through Waste Bank Program in Tabanan District. *Journal of Asian Multicultural Research for Social Sciences Study* 3(4): 17-31.
- [2] Apriliana A, Wahdini N, Pramaningsih V, Suhelmi R, Daramusseng A. 2022. Pendampingan Masyarakat dalam Meningkatkan Pengetahuan Pemilahan Sampah di Kelurahan Selili Kecamatan Samarinda Ilir. *Selaparang Jurnal Pengabdian Masyarakat Berkemajuan* 6(1): 336-340.
- [3] Aulia A, Azizah R, Sulistyorini L, Rizaldi MA. 2023. Literature Review: Dampak Mikroplastik Terhadap Lingkungan Pesisir, Biota Laut dan Potensi Risiko Kesehatan. *Jurnal Kesehatan Lingkungan Indonesia* 22(3): 328-341.
- [4] Dhewanto W, Lestari YD, Herliana S, Lawiyah N. 2018. Analysis of the Business Model of Waste Bank in Indonesia: A Preliminary Study. *International Journal of Business* 23(1): 73-88.
- [5] Eka O, Regina C, Rasha A, Agnes S, Nur S, Nuraisyah A. 2023. Waste Bank in Indonesia: Problem and Opportunities. Proceedings of the Business Innovation and Engineering Conference (BIEC 2022). DOI: 10.2991/978-94-6463-144-9_27.
- [6] Farizal, Aji R, Rachman A, Nasruddin, Mahlia TMI. 2017. Indonesia's Municipal Solid Waste 3R and Waste to Energy Programs. *Makara Journal of Technology* 21(3): 153-159.
- [7] Fikri I, Hafidh F, Sirajuddin H. 2023. Sistem Pengolahan Bank Sampah Berbasis Digital dengan Metode PLC (Project Life Circle). *Technologia* 14 (1): 67-73.
- [8] Guman O, Wegner-Kozlova E. 2020. Waste Management Based on Circular Economy Principles. *E3S Web of Conferences* 177, 04014.
- [9] Luthfiani NL, Atmanti HD. 2021. Waste Management Service in Indonesia Based on Stochastic Frontier Analysis. *Trikonomika* 20(2): 54-61.
- [10] Northcott MS. 2020. Rubbish, Recycling and Religion: Indonesia's Plastic Waste Crisis and the Case of Rumah Kompos in Ubud, Bali. *International Journal of Interreligious and Intercultural Studies (IJIIS)* 3(1): 1-19.
- [11] Pratama A, Kamarubiani N, Shantini Y, Heryanto N. 2020. Community Empowerment in Waste Management: A Meta Synthesis. *Advances in Social Science, Education and Humanities Research* 548: 78-83.
- [12] Satispi E, Samudra AA. 2022. Study of Policy Implementation: Strategy of COVID-Plastic Waste Management in Indonesia. *Journal of Public Policy and Administration* 6(4): 155-164.
- [13] Soliati S. 2019. Community Empowerment in Managing Waste Through Takakura Training. *Journal Empowerment* 8(1): 48-54.
- [14] Subekti R. 2023. A Circular Economy-Based Plastic Waste Management Policy in Indonesia (Compared to China and EU). *Yustisia Jurnal Hukum* 12(2): 168-184.
- [15] Sudrajad E, Domai T, Makmur M, Kumalasari I. 2022. Exploring The Waste Management Policy in Developing Country: Lesson and Challenges from Kediri Regency, Indonesia. *Jurnal Ilmiah Administrasi Publik (JIAP)* 8(3): 304-312.
- [16] Widiyarsari R, Zulfitria, Fakhirah S. 2021. Pemanfaatan Sampah Plastik dengan Metode Ecobrick sebagai Upaya Mengurangi Limbah Plastik. Prosiding Seminar Nasional Pengabdian Masyarakat Universitas Muhammadiyah Jakarta. www.jurnal.umj.ac.id/index.php/semnaskat.
- [17] Zulfa V, Nugraheni PL. 2020. Effectiveness of Community Empowerment in Waste Management Program to Create Sustainable Tourism in Karawang, West Java. *IOP Conf. Series: Earth and Environmental Science* 485: 012087.