

Increasing the Capacity of TPS3R Cadres in Managing Household Waste into Compost

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ARTICLE INFO

Keywords: TPS3R, Household Waste, Compost

Received : 11, October

Revised : 13, November

Accepted: 15, December

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ABSTRACT

Community partnership empowerment was carried out at TPS3R (Reduce, Reuse, Recycle Waste Management Facility), Banjar Taro Kaja, Taro Village, Tegallalang District, Gianyar with the title "Increasing the Capacity of TPS3R Cadres in Managing Household Waste into Compost". Waste management is crucial in both urban and rural areas. The growth of socio-economic activities has resulted in an increase in the volume of waste produced, particularly household waste, in daily life. Waste management requires a sound and sustainable system. Community Partnership Empowerment Activities at TPS3R are a technology transfer where the community is increasingly aware that sorting waste is important and has a positive impact on the environment; Partner groups and cadres make compost from organic household waste; the resulting compost is then used to increase crop yields.

INTRODUCTION

Waste management is a challenge faced by both urban and rural communities. The growth of social and economic activities has resulted in an increase in the volume of waste produced, both organic and inorganic. The impacts of waste include unpleasant odors, fly infestations, and water pollution. Waste can cause problems if there is an imbalance between production and management (Fea Ferdani et al. 2022). Waste is an object deemed useless and discarded by its previous owner or user. However, for some people, this waste can still be used if managed properly (Nugroho, 2013 in Dwi Kurniawati, 2024). The types of waste in this village are divided into two: organic waste and inorganic waste. Organic waste is easily decomposed, while inorganic waste is difficult to decompose.

Household waste is the type of waste most closely associated with daily life. Every day, various types of waste are generated from activities in the kitchen, bathroom, living room, yard, and other areas of the home. From food scraps, plastic wrappers, and glass bottles, to cleaning products and religious ceremonies, yard waste is all part of the household waste that we must manage (Laily R. et al. 2021). Household waste accounts for 38.1% of total waste production. Household waste management is key to maintaining environmental cleanliness and reducing its negative impact on ecosystems. Household waste management is a crucial effort in environmental conservation, particularly given the significant volume of waste generated (Dwi Kurniawati, 2024).

Waste management requires a sound and sustainable system. One strategy for managing household waste is waste separation. Waste can be separated based on its type, such as organic and inorganic waste, thus facilitating subsequent management. Furthermore, household waste management can also be achieved by processing it into products with economic value, such as organic fertilizer or recycled materials (Dwi Kurniawati, 2024). If waste is not managed properly, it will cause aesthetic and comfort problems which are a nuisance to the eyes. In addition, waste consisting of various organic and inorganic materials, if it has accumulated in large enough quantities, is a nest or gathering place for various animals which can become disease vectors, causing bad odors, generally also producing methane gas (CH₄) and carbon dioxide (CO₂) which disrupt air quality and increase air temperature. Household waste dumped in drains and rivers can cause flooding and damage ecosystems. Water pollution can also occur through rainwater leaching, which can contaminate water sources with hazardous substances and render them unsuitable for use. Accumulated organic waste decomposes, becoming a source of diseases such as diarrhea, malaria, worm infestation, dengue fever, and others by becoming breeding grounds for flies, mosquitoes, rats, and cockroaches (Fea Ferdani et al. 2022; Laily R. et al. 2021).

Taro Village is a village in Tegalalang District, Gianyar, with an altitude of 600-750 meters above sea level. The area of Taro Village is 13,083 km², and administratively it is divided into 14 hamlets/dusun. Land use in the Taro Village area is currently divided into 32.25 hectares of residential areas, 248 hectares of rice fields, 869 hectares of plantations/dry fields, 21 hectares of forest, and 138.06 hectares of other uses (public facilities, temples, religious buildings, roads, fields, etc.). (Anonymous, 2022) This village is one of the tourist villages in Gianyar Regency. Taro Village is located between two well-known tourist attractions: Kintamani (to the north) and Ubud (to the south). Its pristine natural surroundings and numerous tourist attractions have made it a popular destination for tourists interested in nature and cultural tourism (Anonimus, 2023). Gianyar Regency has 3 flagship programs, namely First, the Food Security Program in the form of Puspa Aman (Natural (organic) Food Center, Beautiful and Independent). which is inspired by the "Heart of PKK" (Organized, Beautiful and Comfortable Yard) has the concept of utilizing the yard in the form of a garden that can be planted with plants that are useful for family needs, thereby reducing expenses and improving family welfare; Second, TPS 3R as upstream waste management based on Reduce, Reuse and Recycle, which was built by the Gianyar Regency Government in collaboration with the Merah Putih Hijau Foundation and the Taro Village Government and third, the Tourism Village (Anonimus, 2022; Anonimus, 2023).

In Taro Village, waste management and sorting began in 2020 with the presence of TPS3R and cadres in each hamlet. Furthermore, as these activities continued to progress and develop, there was a significant accumulation of waste in the waste collection area, so that every household that had a field behind the house was required to use it as a place for organic waste. Therefore, organic waste from each community is not sent to waste processing facilities, but is instead dumped behind houses or in fields, but not all of it is utilized for processing. The creation of barrels or containers for processing organic waste is also necessary to ensure environmental sustainability in a region and to ensure that the results can be utilized by residents for farming (Sundarta et al. 2018). According to Buhani et al. 2018). Public understanding and awareness of waste management needs to be developed through direct participation activities so that it can increase community competitiveness, especially in improving agricultural crop management, productivity, income and health.

Managing household waste properly not only helps maintain environmental cleanliness but also provides various other benefits:

1. Reducing Waste Volume:

By sorting and recycling waste, we can reduce the amount of waste that goes to landfills. This helps reduce the burden on landfills and extends their useful life.

2. Producing Compost:

Organic waste that is processed into compost can be used as natural fertilizer for plants, reducing dependence on chemical fertilizers.

3. Support Recycling:

Sorting inorganic waste such as plastic, glass, and metal helps support the recycling industry, which reduces the use of new raw materials and saves energy, Reducing Greenhouse Gas Emissions: Good waste management, especially by reducing waste burning, can reduce greenhouse gas emissions that contribute to climate change.

4. Increasing Environmental Awareness:

By managing household waste properly, we can increase environmental awareness within the family and surrounding community. Good and proper household waste management is an important step in maintaining environmental cleanliness and health (Nesle. 2024; Laily R. et.al. 2021).

Compost is an organic fertilizer produced from a conventional composting process or fermentation process using bioactivators (Laily R. et.al. 2021). Organic compost is a fertilizer composed of organic materials derived from plants and/or animals, in solid or liquid form, produced through an engineering process. Organic compost improves the chemical, physical, and biological properties of the soil. Furthermore, organic compost serves as an energy source for soil microorganisms, which play a role in the decomposition process and release of nutrients in the soil (Hamdiani et al., 2018). Making organic compost is very easy and inexpensive, making it possible for anyone to do it independently at home. Household organic waste, which can pollute the environment, can be used to improve soil quality and plant fertility if properly managed (Nalhadi et al., 2020).

Implementation of Community Partnership Empowerment (PKM) in partnership with TPS3R and its driving cadres in each hamlet which is directed at efforts to utilize household waste into compost and the resulting compost products are utilized on a household scale as well as increasing ornamental plants and cultivated plants. Here, counseling and training are provided in the form of technology transfer, namely processing organic household waste into compost products that are produced with good quality, fermentation facilities in each household and application to plants on a household scale.

IMPLEMENTATION AND METHODS

The implementation of community service was carried out at TPS3R Banjar Taro Kaja, Taro Village, Tegalalang District, Gianyar. In order for the implementation to run well, the methods used were:

1. Interview and discussion method to find out the problems faced by partners.
2. Extension methods through direct face-to-face meetings so that partners gain knowledge regarding the application of technology regarding the use of household waste to make compost products.
3. Handing over materials and tools that can be used in making compost from household waste to partners accompanied by members who will later implement it on a household scale.

4. Direct practice was carried out at TPS3R with the driving cadres, there was still organic household waste piled up, starting from collecting dry waste, then chopping it with the existing machine, after that it was mixed with molasses and EM4, put into a fermentation barrel called an edan barrel and fermented for 3 weeks, then solid and liquid organic fertilizers would be obtained separately.
5. Monitoring, mentoring, and evaluation; the Community Service team conducts regular monitoring and mentoring to ensure the success of household waste composting. Furthermore, an analysis is conducted of potential problems arising from the partners.

From the method used, the stages undertaken are as follows:

1. Exploration of partner group extension and practice sites
2. Socialization of activities to be implemented in the group by explaining the implementation.
3. Extension, distribution of materials and tools, and practice of making compost from household waste.
4. Mentoring, monitoring, and evaluation of implemented activities.

RESULTS AND DISCUSSION

As a university that always upholds the Tridharma activities of Warmadewa University, through the Community-Based Empowerment Program (PBM), namely Community Partnership Empowerment (PKM) which is developed through community service activities, it encourages its academic community to assist the community. The Community Partnership Empowerment Program (PKM) can motivate TPS3R members and cadres and maximize activities that involve all members actively and creatively in providing outreach on making solid and liquid compost from household waste. The outreach program involved transferring technology for making organic fertilizer from household waste and motivating members, cadres, and the community to make it independently. This was evident in the enthusiasm of the partner groups in doing so (Figure below). This community service initiative has resulted in technology transfer and assistance with materials and tools, with the following outcomes for each solution:

Transfer of Household Waste Management Technology into Compost Products and Its Utilization

In the partnership empowerment program in the form of community service carried out at TPS3R Banjar Taro Kaja, innovative and technological products can be developed for the community to strengthen community independence in managing waste and increase its economic value, is: Household-scale waste sorting is the most important thing in reducing the burden on TPS3R and encouraging a culture of environmental care and increasing compost raw materials; the innovation implemented is in the form of a small composter tool called TONG EDAN which can produce solid compost and liquid fertilizer that is rich in nutrients for plants, where the process is fast, easy and odorless.

Household waste produced daily needs to be sorted into organic and inorganic waste, so motivation and awareness are provided to the community to continue sorting waste starting from the household scale and provide an understanding that waste has an impact on the environment and health. The community is increasingly aware that sorting waste is an important thing that has a positive impact on the environment; 100% of every household in the Taro Kaja Village area sorts waste. Inorganic waste in Taro Kaja Village is collected or disposed of at TPS3R, while organic waste on a household scale has not been managed and is still left piled up behind the house, because knowledge about the impact of waste on the environment and health is not properly understood. It is necessary to understand that organic household waste can be used to make compost (organic fertilizer) of good quality.

Technology transfer program on household waste processing (organic) with the target of TPS3R cadres being able to process and produce compost products which will then be distributed to the community so that they can increase added value and/or for cultivated plants on a household scale. Composting with the Edan Tong, a method of processing household organic waste, is possible for communities without land. It utilizes a closed barrel to quickly convert kitchen scraps into compost and liquid fertilizer. The name "Edan" stands for Economical, Dynamic, and Reliable, which refers to a practical and effective process. The partner group, members, and cadres of the TPS3R in Taro Kaja Village are 100% knowledgeable and capable of making organic fertilizer/compost from household waste.

People are unaware that compost and liquid organic fertilizer (POC) can be beneficial for the environment and agriculture. Compost and liquid organic fertilizer (POC) from household waste play a crucial role in reducing waste, enriching the soil, and improving plant health. Compost improves soil structure to make it looser and increases water absorption capacity, while POC provides macro and micro nutrients quickly and stimulates overall plant growth. The result is that partner groups, cadres, and the community can utilize the compost produced for application to cultivated plants on a household scale to increase crop yields and create a beautiful environment by planting ornamental plants using compost media.



Figure 1. Community Service Material Extension



Figure 2. Field Practice of Making Compost from Household Waste with Tong Edan



Figure 3. Application of the Resulting Compost Product

Capacity Building of TPS3R Cadres

The TPS3R Cadres of Taro Village are a team or group of people who work to manage waste in Taro Village, Gianyar, Bali, under the 3R-Based Waste Processing system (Reduce, Reuse, Recycle). They play a crucial role in maintaining environmental cleanliness and sustainability, especially amidst the increasing amount of waste in Bali. Their duties include collecting, sorting, and processing waste directly at the village level, in accordance with government regulations regarding waste management. In the TPS3R of Taro Kaja Village, there is a rule that only inorganic waste is transported to the TPS3R, while organic waste is managed at the household level. This needs to be strengthened for TPS3R cadres to spread to the Banjar Taro Kaja community.

At TPS3R which is under the BUMDES of Taro Village, with human resources as the front guard in the sustainability of the planned program, management capacity needs to be improved. The limited capacity of members to manage their groups in various activities needs to be improved through technology transfer, strengthening partner institutions, and structuring partner management to ensure the organization operates effectively and efficiently through effective outreach and communication. Communication allows people to coordinate their activities to achieve common goals, but communication is not just the transmission of information or the transfer of meaning. 90% of partner groups have been able to work together and be united in establishing communication and developing their members so that they are able to become pioneers and continue to be passed on to the surrounding community in running the organizations they lead.

Material and Equipment Assistance

The availability of materials and equipment used in the process of making compost from household waste determines the success of the product. TPS3R Banjar Taro Kaja requires more representative materials and equipment for household-scale management, following the latest technological developments, so that there is no accumulation of organic waste behind the house. The materials and equipment provided are expected to simultaneously produce solid compost and liquid organic fertilizer that is easily accessible and can be used in cultivation. Materials and equipment have been provided to partners for use in household waste management.



Figure 4. Handover of Materials and Tools

CONCLUSIONS AND RECOMMENDATIONS

TPS3R Banjar Taro Kaja partners, in their Community Partnership Empowerment program, have successfully adopted all the materials provided. This is demonstrated by, among other things:

- 1) The Banjar Taro Kaja community within the partner area is motivated to be more active in sorting waste at the household level, so that the quality of compost raw materials improves, and the composting process becomes more efficient and freer from inorganic material contamination.
- 2) TPS3R cadres understand and are able to make compost and liquid organic fertilizer from organic household waste, thereby helping to overcome environmental and sanitation problems.
- 3) The compost product produced can be applied to cultivated plants on a household scale because it is able to improve soil structure, add natural nutrients, and increase soil fertility.
- 4) Assistance with materials and tools for composting household waste at the TPS3R can support household waste processing activities. With community support, strengthening of group management organizations, and simple technology, such as Tong Edan, this system can eventually become a model for integrated and sustainable agriculture.

Some things that are suggested for sustainability are:

1. There is a need to continuously increase education and outreach to the community regarding the importance of waste sorting and how to make compost from house to house.
2. There is a need for more assistance in the form of materials and tools for
3. processing activities, such as separate waste bins, household composters, and local bioactivators that need to be provided or facilitated by the government/village/CSR.
4. Multi-party collaboration is needed between the community, government, private sector, and educational institutions to develop technological innovation and expand the reach of programs.

ACKNOWLEDGMENT

We would like to thank the Rector of Warmadewa University through the Directorate of Research and Community Service for the opportunity and funding provided to implement the Community Partnership Empowerment program; to the Dean of the Faculty of Agriculture, Science and Technology of Warmadewa University who has provided input and encouragement; to the Head of Taro Village, BUMDES who has provided direction and facilities; the Chairperson, members and cadres of TPS3R for their diligent participation in this activity; and to the team of lecturers and students who have helped and participated in this program. Thank you.

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