

Empowerment of Housewives through Compost Making Training for Organic Waste Management using the Takakura Method in Bebandem Village, Karangasem

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ABSTRACT

The increasing volume of organic waste in Bebandem Village, Karangasem, poses a serious environmental challenge due to limited understanding among housewives regarding independent waste management. This issue is critical, as household waste constitutes the largest portion of total waste generation in Bali, reaching 915,482.47 tons annually (KLHK, 2025). To address this, the PPK Ormawa KSR-PMI Team of Udayana University implemented a community empowerment initiative through the Prabu Literacy Corner (Environmental Literacy Corner), offering comprehensive training on composting using the Takakura method to 39 housewives. Conducted over ten structured sessions including socialization, practice, and evaluation, the program enhanced participants' skills and environmental awareness. Results showed that 100% of participants could now sort waste (an increase of 60.53% from 39.47%) and fully mastered Takakura composting skills (up from 0%). The final achievement rate reached 96.91%, categorized as "Excellent." This training improved community independence in processing waste at its source, converting organic waste into value-added compost, and fostering sustainable environmental behavior. The empowerment model demonstrates strong potential for replication in other communities, particularly rural areas with similar socio-economic characteristics. Integrating environmental literacy with hands-on practice provides an effective and holistic approach to waste management, addressing both knowledge and behavioral change, and supporting sustainable development aligned with SDG Goal 12 on responsible consumption and production.

Keywords: *Housewives Empowerment, Takakura Compost, Organic Waste, Environmental Literacy, Bebandem Village.*

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INTRODUCTION

Lifestyle changes and an increase in the population on a national scale have led to a significant increase in the volume of waste in Indonesia. Based on data from the Ministry of Environment and Forestry (MoEF), waste generation will reach 35.3 million tons in 2024, with food waste being the largest component with a percentage of 41.5%. This condition is reflected in the Province of Bali, based on the National Waste Management Information System (SIPSN) which recorded that waste generation in 2021 reached 915,482.47 tons/year, with the largest portion of waste coming from household waste (Kementerian Lingkungan Hidup dan Kehutanan, 2025). Piles of garbage and waste that are disposed of can have a negative impact on the environment and public health, so appropriate handling efforts are needed. This waste and waste management is in line with the Sustainable *Development Goals* (SDGs) goals, which by 2030 each country is expected to be able to significantly reduce the amount of waste through prevention, reduction, recycling, and reuse, in order to support sustainable product consumption patterns (Central Statistics Agency, 2018). According to the United Nations Environment Programme, effective waste management at the household level is crucial for achieving SDG targets, as households contribute approximately 60-70% of total municipal solid waste in developing countries (United Nations Environment Programme, 2021). Moreover, organic waste, which constitutes the largest fraction, presents both a challenge and an opportunity—while it contributes to greenhouse gas emissions when improperly disposed,

it can be transformed into valuable compost that enhances soil health and supports sustainable agriculture (Food and Agriculture Organization, 2020).

One of the areas facing this challenge is Bebandem Village in Karangasem Regency. Most of the people of Bebandem village, especially housewives' groups who have a major role in domestic waste management and there are still many who do not have the understanding and skills to process household waste independently. From the results of interviews with the village PKK group, food waste and kitchen activity residues are generally still mixed with inorganic waste and directly deposited to TPS3R officers in Bebandem Village. This mixing of organic and inorganic waste not only reduces the efficiency of waste collection systems but also eliminates the potential for resource recovery and creates additional burden for waste management facilities (Zahra et al., 2025). As a result of the audience with the Head of Bebandem Village, the lack of education about effective waste management methods at the household level is the main problem that causes the behavior of the community to still not be able to manage household waste independently. People today prefer to directly dispose of their waste at the polling station or landfill because it is considered easier and more practical. This is also due to the lack of adequate facilities for waste management, low awareness and knowledge about the importance of waste management, and considering comfort factors such as smell and dirt when processing waste (Zahra et al., 2025). Research by Silolongan and (Apriyono, 2019) further confirms that behavioral barriers, including limited knowledge, negative attitudes toward waste handling, and perceived inconvenience, are the primary obstacles to effective household waste management in Indonesian communities. These findings underscore the critical need for comprehensive educational interventions that address not only technical skills but also attitudinal and motivational factors.

As a solution to overcome these problems, various household-scale composting methods have been developed. One method that has proven to be effective, practical, simple, and easy to implement is the Takakura composter method (Rosmala et al., 2020). Takakura compost is a method of making household organic waste compost that was pioneered by Koji Takakura who originated in Japan. This method aims to convert household kitchen waste into compost in a special basket container with a fermentation process. The Takakura basket is composed of several layers, namely the bottom husk pad, finished compost, organic waste, the top husk pad, the porous black fabric and the basket cover and cardboard lining on each side of the basket. Each layer has the function of maintaining air circulation, reducing unpleasant odors, and accelerating the decomposition of organic waste into compost (Jumiarni et al., 2020). The layered structure of the Takakura basket creates optimal conditions for aerobic decomposition by facilitating oxygen flow while maintaining appropriate moisture levels, which are critical factors for microbial activity in the composting process (Destiasari et al., 2024). The use of rice husk as an insulating and bulking agent helps maintain internal temperature between 40-60°C, which is ideal for thermophilic bacteria that accelerate organic matter decomposition (Arumdapta et al., 2025). This takakura does not require a large area of land and the processing process does not cause an unpleasant odor, so it is suitable for application in the environment around the house (Hananingtyas et al., 2020). With this Takakura method, people will indirectly sort household waste because all that is needed is household organic waste in this method. Sorting household waste from its source is the earliest

and most fundamental solution for effective waste management, reducing pollution, preventing buildup in landfills, and being the key to successful waste management (Lingga et al., 2024).

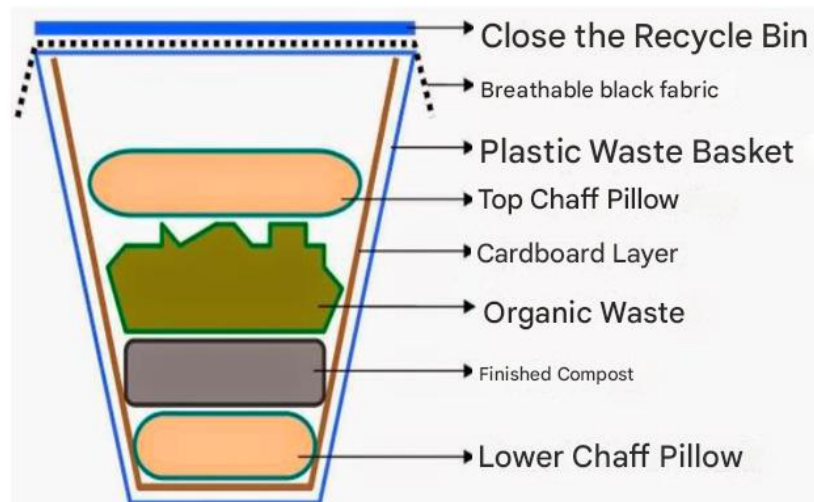


Figure 1. Takakura Compost Basket Arrangement

Source: Adapted from Rosmala et al. (2020) and PPK Ormawa KSR-PMI Documentation, 2024

Based on this description, the implementation team of the Capacity Building Program (PPK) of Ormawa KSR-PMI Udayana University carried out community service activities in Bebandem Village with a program to provide education and training to groups of housewives in Bebandem Village, Karangasem, related to organic waste management through the application of the Takakura composter method which aims to increase public awareness of environmental issues. This program is implemented through the Prabu Literacy Corner or Environmental Literacy Corner which contains structured assistance so that this activity is expected to provide practical skills in making and caring for composters and encourage community independence in managing organic waste from its source, so that it can produce compost as a value-added product. This program is implemented through the Prabu Literacy Corner (Environmental Literacy Corner), a dedicated learning space that provides structured, multi-session assistance integrating environmental education with practical skills development. The establishment of this literacy corner represents an innovative approach to community empowerment that combines formal educational principles with informal, participatory learning methods. This activity is expected to provide practical skills in making and caring for composters and encourage community independence in managing organic waste from its source, so that it can produce compost as a value-added product that can be used for home gardens or potentially marketed to generate supplementary income. The integration of literacy education with practical waste management training addresses the multidimensional nature of behavioral change, encompassing cognitive (knowledge), affective (attitude), and psychomotor (skills) domains, thereby creating a more sustainable and holistic empowerment model (Pratama et al., 2020). Furthermore, by focusing on housewives as the primary target group, this program recognizes the pivotal role of women in household decision-making and daily waste management practices, aligning with gender-sensitive approaches to environmental sustainability (Fadilah et al., 2024).

METHOD

The service activity in Bebandem Village was carried out by the PPK Ormawa KSR-PMI Team of Udayana University consisting of 14 students using the training method and assistance in making compost using the Takakura method through the establishment of the Prabu Literacy Corner located in Banjar Dinas Putih, Bebandem Village. The implementation of the activity took place in a structured manner in ten meeting sessions from July 29, 2025 to September 26, 2025. The meeting session at the Prabu Literacy Corner was coupled with participatory training activities and mentoring for 39 housewife participants in Bebandem Village. This method was chosen to ensure that participants not only received theoretical knowledge, but also mastered practical skills and were able to overcome obstacles independently.

In the pre-activity, the PPK Ormawa KSR-PMI Team of Udayana University conducted a survey and audience together with the Head of Bebandem Village for planning and licensing of program implementation activities in the village. After obtaining the permit, the team held a joint audience with the PKK group and the Bebandem Village TPS3R Manager for the formation of a target group and the procurement of tools and materials in the Takakura Composter training. The stages of activities at the Prabu Literacy Corner are designed to be structured and systematic with guidance from the non-formal teaching curriculum that has been prepared by the PPK Ormawa KSR-PMI Team of Udayana University together with the Accompanying Lecturer as experts in pre-activities.



Figure 2. Audience with the Head of Bebandem Village and the Target Group Management

Source: PPK Ormawa KSR-PMI Udayana University Documentation, 2024

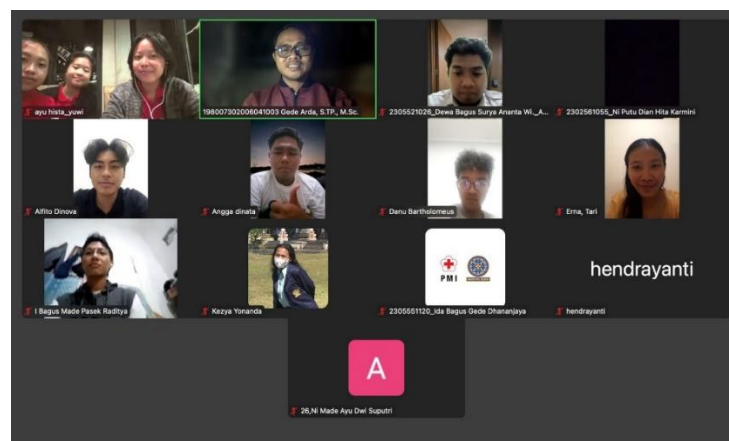


Figure 3. Program Plan Discussion with Accompanying Lecturers Online

Source: PPK Ormawa KSR-PMI Udayana University Documentation, 2024



Figure 4. Procurement of Takakura Compost Tools and Materials
 Source: PPK Ormawa KSR-PMI Udayana University Documentation, 2024

Table 1. Teaching Curriculum

Meeting	Purpose	Material	Method	Output
Introduction & Socialization	Provide an understanding of Takakura's waste problems & solutions	<ol style="list-style-type: none"> The problem of organic and inorganic waste. What is Takakura? Benefits for the environment. 	Interactive lectures + Presentation slides	Participants understand waste problems and basic concepts of waste management, especially organic waste
Tools, Materials & Preparation of the Composter	Participants recognize and prepare Takakura tools and materials	<ol style="list-style-type: none"> Tools & materials. Types of garbage. Compost starter creation 	Demonstration + discussion + FGD	Participants were able to prepare tools and materials as well as how to make a composter
Takakura Compositor Making Practice	Participants make their own composter	<ol style="list-style-type: none"> Takakura basket making steps. Initial charging 	Hands-on practice	Participants have 1 active composter
Initial Assistance	Participants manage the composter	<ol style="list-style-type: none"> Stirring technique Keeping moisture Odor prevention 	Field visit + mentorship	Participants can take care of the composter
Sharing Experiences & Discussion of Constraints	Participants share their initial experiences	<ol style="list-style-type: none"> Initial constraints (smell, maggots, dry/wet) Practical solutions 	Group discussions	Participants are more confident in caring for the composter
Monitoring the Fermentation Process	Participants understand the development of compost	<ol style="list-style-type: none"> Physical changes in waste How to identify the results of observations 	Observation practice + field notes of discussion	Participants can recognize compost marks in the process
Harvesting Trial Compost	Participants recognize the characteristics of semi-mature and mature compost	<ol style="list-style-type: none"> Long process. Characteristics of mature composting. Harvesting techniques 	Harvest demonstration	Participants can harvest ready-to-use compost
Economic Value of Compost	Participants get to know the economic opportunities of compost	<ol style="list-style-type: none"> Packaging & marketing of compost. Business potential. Case study 	Discussion & case studies	Participants realized the economic value of compost
Compost Utilization for Plants	Participants take advantage of compost in the garden/yard	Use of compost on vegetable, flower, fruit plants.	Fertilization practices	Participants were able to apply compost to plants

Sustainability Evaluation & Plan	Evaluate program and success follow-up	1. Reflection on results. 2. Development plan. 3. Group sustainability	Discussion + Evaluation	Participants are committed to continuing Takakura independently and in groups
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Source: Adapted from standard educational assessment criteria and customized for Takakura composting training by PPK Ormawa KSR-PMI Udayana University Team, 2024

To measure the success rate of activities, quantitative and qualitative evaluation approaches are used. Quantitatively, achievement was measured using a weighted assessment rubric at each meeting that covered various criteria using an assessment scale of 1-5 and converted in the form of a percentage of achievement. In addition, data collection was carried out on participants' ability to sort waste and make Takakura compost at the beginning and end of the activity to see changes in the behavior of the target participants. Qualitative measurement of success was carried out through direct observation with field notes during training, mentoring, and discussion analysis during the experience sharing session to assess changes in the attitude and understanding of target participants towards household waste management.

Table 2. Assessment Rubric

Meeting	Detailed Assessment Criteria (Scale 1-5)	Percentage
1	Active Participation & Basic Understanding 5 (Perfect): Very active participation, asking relevant questions, and able to explain Takakura's concepts succinctly. 3 (Adequate): Passive participation, only answering when asked, demonstrates basic understanding. 1 (Not Achieved): Not participating and not showing a basic understanding of the material.	7,69%
2	Readiness & Understanding of Tools and Materials 5 (Perfect): Able to prepare/identify all the main tools and materials (including compost starters) and explain their functions without guidance. 3 (Sufficient): Able to identify most ingredients, but still confused with the function of starter or initial filling ingredients. 1 (Not Reached): Unable to identify or prepare key tools and materials.	11,54%
3	Quality of Composter Manufacturing 5 (Perfect): The composter is made according to all the steps, the initial filling material is just right (moisture content is just right), the placement in the basket is optimal, and it is ready to use (active composter). 3 (Sufficient): The composter is made, but there are incorrect details (e.g., the initial filling is too wet/dry) that could potentially cause failure, need immediate repair. 1 (Not Reached): Failed to make the composter or composter unsuitable (e.g., incorrect container selection).	19,23%
4	Basic Care Skills 5 (Perfect): Able to demonstrate correct and independent stirring and humidity checking techniques, and be able to identify potential problems (e.g., lack of stirring). 3 (Sufficient): Stirring/checking, but not yet consistent and still hesitant in determining when to add water/dry ingredients. 1 (Not Reached): Shows no maintenance effort or makes fatal mistakes (e.g., stirring too hard to damage the media).	7,69%

5	<p>Sharing & Troubleshooting Activities</p> <p>5 (Perfect): Share specific experiences (obstacles or successes) and provide relevant solutions/questions for the group to discuss.</p> <p>3 (Sufficient): Active listening, but only responding to or repeating experiences/questions that others have already discussed.</p> <p>1 (Not Reached): Not participating in group discussions.</p>	7,69%
6	<p>Field Recording & Observation</p> <p>5 (Perfect): Able to identify at least 3 physical changes (temperature, texture, smell, animal presence) and record them completely.</p> <p>3 (Sufficient): Only identifies 1-2 physical changes or less detailed notes.</p> <p>1 (Not Achieved): Failed to identify changes or did not make observational notes.</p>	7,69%
7	<p>Harvesting Skills & Identification of Mature Compost</p> <p>5 (Perfect): Able to demonstrate correct harvesting techniques, separate mature compost from undecomposed material, and accurately explain the characteristics of mature compost (texture, color, smell).</p> <p>3 (Sufficient): Performing the harvesting process, but the separation results have not been cleaned, or misidentified the characteristics of the mature compost.</p> <p>1 (Not yet achieved): Unable to carry out the harvest process independently.</p>	11,54%
8	<p>Contribution of Economic Ideas</p> <p>5 (Perfect): Provide at least 2 innovative ideas/suggestions related to packaging, marketing, or the potential of an original and realistic Waste Bank.</p> <p>3 (Sufficient): Provide at least 1 idea that is general or less realistic.</p> <p>1 (Not Achieved): No idea contributions.</p>	7,69%
9	<p>Compost Application Practice</p> <p>5 (Perfect): Able to apply compost to test plants in the right dosage and manner (e.g., not sticking directly to the stem) and explain the benefits.</p> <p>3 (Sufficient): Doing the application, but the dosage is not right (too much/too little) or the application method is still wrong (e.g., stacked at the base of the stem).</p> <p>1 (Not Reached): Failed to apply or did not bring/prepare trial plants.</p>	11,54%
10	<p>Personal Reflection & Action Plan</p> <p>5 (Perfect): Draw up a minimum of 3 points of a personal action plan for sustainable waste management (e.g., target waste volume, location of a new composter) that is measurable and realistic.</p> <p>3 (Sufficient): Compile 1-2 points of action plan that are still common.</p> <p>1 (Not Achieved): Not Developing an Action Plan.</p>	7,69%

Source: Adapted from standard educational assessment criteria and customized for Takakura composting training by PPK Ormawa KSR-PMI Udayana University Team, 2024

Table 3. Final Assessment Categories

Category	Value Range	Category
Excellent (A)	90%-100%	Perfect Mastery. Participants master all aspects of theory and practice. All outputs (especially active composters, harvests, and applications) are achieved with high quality and self-containment. Participants have the potential to be examples or community movers.

Baik (B)	80%-89,99%	Good Mastery. Participants mastered most of the theory and practice well. All major outputs are successfully achieved, requiring little guidance on small details.
Enough (C)	70%-79,99%	Basic Mastery. Participants master the basic aspects that are mandatory. The main outputs (composter and harvest) are achieved, but the quality varies and requires regular guidance. This is the expected minimum passing standard.
Less (D)	60%-69,99%	Minimal Mastery. Participants only master basic theory and only achieve a fraction of the practical output. There is a substantial failure at one of the meetings with a large weight (e.g., the composter fails or is not maintained).
Very Less (E)	Under 60%	Failed/Need to Repeat. Participants do not show sufficient effort or fail to achieve most of the expected practice outputs in the training.

Source: Adapted from standard educational assessment criteria and customized for Takakura composting training by PPK Ormawa KSR-PMI Udayana University Team, 2024

RESULTS AND DISCUSSION

From the results of the Prabu Literacy Corner activities, it was recorded that of the 39 participants, only 16 people ($\approx 39.47\%$) were previously accustomed to sorting household waste independently, and after the meeting, all participants (100%) were able to carry out sorting. This means that there has been an increase in behavior reaching 60.53%. In addition, all participants also managed to master composting skills using the Takakura method, showing a 100% success rate. The overall achievement achieved a rubric score of 97% ("Excellent"), which indicates the participants' almost complete mastery of theoretical and practical aspects.

These results are in line with the findings by (Dian S et al., 2023), that the application of the Takakura method on a household scale is able to increase people's knowledge and skills in managing organic waste in a simple and effective way. The Takakura method is often referred to as a method that is relatively easy to apply independently by the general public because it does not require large land or high technology (Rosmala et al., 2020). The success of the transformation of participants' behavior can be explained from the aspects of environmental literacy and psychosocial factors. According to research on environmental literacy, understanding of environmental issues, positive attitudes, and supportive skills are essential to encourage environmental responsibility (Pratama et al., 2020). In this context, the environmental literacy program through the "Prabu Literacy Corner" has succeeded in improving knowledge and attitudes into real practice.

In terms of housewife participation, research in Pontianak showed that 94% of respondents actively participated in waste management after literacy and training interventions (Fadilah et al., 2024). Based on research in Pangkalpinang, it was found that knowledge, attitudes, facility support, and concrete actions together have a significant effect on improving household waste management behavior (Ratih et al., 2024). This supports the interpretation that the success of the Prabu Literacy Corner is not only due to knowledge transfer, but also mentoring, facilities, and the formation of long-term habits. Based on the theory of behavior change (e.g., Theory of Planned Behavior), the perceived behavioral control factor greatly determines whether a person feels capable of taking environmental actions. In a new study on

"Zero Waste Behavior" in Indonesian urban households, it was found that the perception of self-control (i.e. the belief that a person is capable of managing their own waste) is the strongest predictor of the actual actions of the 3R (Reduce, Reuse, Recycle) (Amir et al., 2025).

In the case of the Prabu Literacy Corner, direct mentoring and practical sessions allowed participants to develop a 'sense of capability', i.e. feeling confident that they were able to sort and make compost, so that the adoption of behavior became more real. Nevertheless, there are some important notes. For example, based on the study "Takakura Composting" on a household scale shows that although parameters such as temperature, color, texture of the compost have met the standards, the humidity and pH parameters are sometimes below the SNI 19-7030-2004 standard (Arumdapta et al., 2025). This indicates that even if the participants succeed in composting, the optimal quality of the compost may not always be achieved. Therefore, in the follow-up of the program, further coaching needs to be focused on controlling these technical parameters to improve the quality and quantity of compost.

Waste management training activities using the Takakura method did not run smoothly. Several technical and social obstacles arise and require adaptive solutions by the PPK Ormawa implementation team. In the early stages, participant participation tends to be passive, this is likely due to low environmental literacy and lack of hands-on experience in organic waste management. This is consistent with findings in community waste management studies that the factors of initial knowledge and individual motivation are the main obstacles to changing environmental behavior. (Silolongan and Apriyono, 2019). In the implementation of Takakura's own composting technique, obstacles such as difficulty in maintaining moisture content, unpleasant odors, and the appearance of maggots were technical problems that were also reported in the literature on Takakura's method. (Arumdapta et al., 2025). Takakura's composting method was also criticized in a review of composite methods that operational constraints such as humidity regulation became a real challenge. (Destiasari et al., 2024).

Socio-economic aspects and the perception of benefits are also obstacles in making compost, for example, the emergence of doubts among participants about the economic value of compost, or limited land and equipment to apply compost. In the research of Tanjung Terdana village, economic barriers and limited facilities are real challenges in the implementation of Takakura independently (Jumiarni et al., 2020). Based on a study in Purbonegaran, it also shows that although public interest is high, there are still obstacles in the provision of facilities and individual readiness that must be overcome. (Sulistiyani et al., 2020). Concerns about the sustainability of the program after mentoring are also an important issue. Without an institutional structure or local agent capable of continuing mentoring, there is a risk that the practice will stop after the program is completed (Hodijah et al., 2022).

From a sustainability point of view, the transformation of participants into environmental agents in the surrounding environment is very potential. If each participant can influence other neighbors or families, then the effect can spread to the wider community. This is in line with the idea that environmental literacy is not only knowledge transfer, but the formation of culture (cultural change) in the long term (Azdkia et al., 2024). For this reason, it is recommended that the program be equipped with a "social reinforcement" system (e.g. peer support groups, experience exchange forums, periodic monitoring) so that good behavior does not return to old habits. Thus, Prabu's Literacy Corner not only succeeded in improving knowledge and skills, but also proved that structured interventions through socialization,

practice, mentoring, and evaluation can result in real transformation in household waste management. However, this success still needs to be tested in the long term and tested for replication in the context of other villages so that it can become an effective model of community empowerment.

CONCLUSION

The community service program by the PPK Ormawa KSR-PMI Team of Udayana University through the Prabu Literacy Corner in Bebandem Village successfully enhanced the understanding and skills of 39 housewives in organic waste management using the Takakura composter method. The program's achievement rate of 96.91% (Excellent) reflected significant improvement, with all participants able to sort waste and produce compost—up from 39.47% and 0%, respectively. Its strength lay in structured, participatory mentoring that effectively fostered behavioral change, though initial passivity, technical issues such as odor and maggots, and doubts about compost's economic value posed challenges. Future research should focus on developing advanced training modules to improve compost quality in line with environmental standards and explore sustainable community models—such as cooperative networks or shared learning groups—to strengthen long-term program independence and replication in other rural areas.

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