

Community Empowerment through an Integrated Waste Management System Based on Local Wisdom in Blahkiuh Village, Abiansema District, Badung Regency, Bali, Indonesia

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Abstract

The increasing volume of solid waste in Blahkiuh Village, Abiansema District, Badung Regency, driven by population growth, residential expansion, and socio-economic activities, has created an urgent need for a more effective, participatory, and sustainable waste management system. The main challenges include the low rate of waste segregation at the household level, limited institutional capacity in community-based waste management, and the continued reliance on final disposal sites. This community service program aimed to strengthen the capacity of the village government and local community in developing an integrated waste management system based on local wisdom through improved governance, institutional strengthening, and active community participation. The implementation methods consisted of community outreach, capacity-building workshops, technical assistance in developing village regulations and Standard Operating Procedures (SOPs), the establishment of a community waste management working group, the implementation of a monitoring and evaluation system, and the formulation of sustainability strategies involving the village government, traditional village institutions, women's organizations (PKK), youth organizations, and community members. The program resulted in increased public awareness of waste segregation, the development of village regulations and SOPs for waste management, the establishment of a community-based waste management institution, and enhanced community participation through the application of the Tri Hita Karana philosophy. The program contributed to strengthening environmental governance, improving the quality of public services, and promoting a more sustainable community-based waste management system. Therefore, this empowerment model has the potential to serve as a best practice that can be replicated in other rural communities facing similar environmental challenges.

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1. INTRODUCTION

Solid waste management has become one of the most critical environmental challenges in rural development, particularly in areas experiencing rapid population growth, residential expansion, and increasing socio-economic activities. Blahkiuh Village, located in Abiansema District, Badung Regency, Bali, is a transitional area between the urban center of Denpasar and the surrounding rural communities. This strategic location has accelerated socio-economic transformation, including the growth of settlements, micro and small enterprises, household activities, and traditional cultural ceremonies, all of which contribute significantly to the

increasing generation of municipal solid waste. According to the proposed community service program, household activities, micro and small enterprises, and religious and customary ceremonies constitute the primary sources of waste in Blahkiuh Village. However, waste segregation at the household level remains below 30%, indicating that waste reduction initiatives have not yet been effectively implemented at the source.

At the national level, waste management is no longer regarded solely as a technical issue related to collection and transportation but has evolved into a multidimensional governance challenge involving institutional capacity, community participation, environmental awareness, and the quality of public services. Law Number 18 of 2008 concerning Waste Management emphasizes that waste reduction and handling must be implemented systematically, comprehensively, and sustainably [1]. Consequently, local communities are expected to play an active role not merely as recipients of public services but also as key stakeholders responsible for waste reduction, segregation, recycling, and resource recovery. Nevertheless, waste management practices in Blahkiuh Village remain predominantly based on the conventional "collect–transport–dispose" approach. This linear management system increases dependence on final disposal sites, raises operational transportation costs, and contributes to environmental degradation through soil and water pollution as well as greenhouse gas emissions generated from the decomposition of organic waste [2]. Therefore, implementing a community service program that promotes an integrated and participatory waste management system is highly necessary to transform the existing conventional practices into a more sustainable governance model.

The existing conditions of the community partner indicate that the major challenges extend beyond low public awareness. More importantly, weaknesses remain in institutional governance, regulatory frameworks, operational procedures, and environmental public service delivery. The proposal identifies several priority issues, including the absence of village regulations specifically governing waste management, the lack of Standard Operating Procedures (SOPs), the absence of an officially established waste management working group, limited community participation in waste segregation, and inadequate public service mechanisms for waste collection and complaint handling. These findings demonstrate that improving waste management in Blahkiuh Village requires a comprehensive governance approach rather than merely providing physical facilities such as waste bins or transportation vehicles.

Based on these circumstances, the primary problem addressed in this community service program is how to establish an integrated community-based waste management system rooted in local wisdom that is capable of strengthening governance, enhancing institutional capacity, encouraging community participation, and reducing dependence on landfill disposal. This problem formulation serves as the foundation for implementing the program because waste management cannot be effectively addressed through technical interventions alone. Instead, it requires collaboration among the village government, traditional village institutions, women's organizations (PKK), youth organizations, micro-enterprises, and local residents. From the perspective of collaborative governance, successful public problem-solving requires the active involvement of multiple stakeholders in policy formulation, implementation, and evaluation [3]. Ansell and Gash argue that collaborative governance emphasizes dialogue, mutual trust, shared commitment, and collective responsibility among stakeholders in addressing complex public issues [3]. This approach is particularly relevant to village-level waste management because the sustainability of environmental programs largely depends on strong institutional support, effective local leadership, and meaningful community engagement.

Previous studies have consistently demonstrated that the success of community-based waste management is strongly influenced by behavioural change and the diffusion of social innovation. According to Rogers' Diffusion of Innovations theory, an innovation is more likely to be adopted when it offers relative advantages, aligns with local socio-cultural values, is easy to understand, can be tested, and produces observable outcomes [4]. Therefore, community-based waste management should be designed not merely as a technical intervention but also as a process of

social learning and community empowerment. Within the Balinese socio-cultural context, the philosophy of Tri Hita Karana, particularly its Palemahan dimension emphasizing harmony between human beings and the natural environment, provides an important normative foundation for fostering environmental awareness and sustainable community behaviour. Integrating local wisdom into environmental governance is expected to increase public acceptance because culturally embedded approaches are generally more effective than purely administrative or top-down interventions.

Furthermore, the principles of good governance emphasize transparency, accountability, participation, effectiveness, and responsiveness as essential components of quality public service delivery [5]. These principles are highly relevant to the needs of Blahkiuh Village, particularly in establishing standardized waste collection schedules, transparent service fees, accessible complaint mechanisms, and measurable service performance indicators. Likewise, Law Number 25 of 2009 concerning Public Services highlights that public service delivery should be based on legal certainty, transparency, accountability, participation, and efficiency [6]. Accordingly, village waste management should be recognized as an integral component of environmental public services rather than merely a sanitation activity.

To address these challenges, the present community service program introduces a comprehensive intervention consisting of community socialization, institutional capacity building, technical assistance in drafting village regulations and Standard Operating Procedures, the establishment of a Village Waste Management Working Group (Pokja Sampah), the implementation of an indicator-based monitoring and evaluation system, and continuous mentoring to ensure program sustainability. Expected outputs include village regulations governing waste management, operational SOPs, public service performance indicators, an officially established community waste management institution, strengthened organizational capacity, increased household waste segregation practices, a minimum 20% reduction in waste transported to final disposal sites, and community satisfaction with waste management services exceeding 70%.

The novelty of this community service program lies in its integration of community-based waste management, collaborative governance, environmental public service reform, and the incorporation of Tri Hita Karana as a local governance framework. Unlike many previous community service programs that primarily focus on technical waste processing activities such as composting, eco-enzyme production, or waste bank management, this program approaches waste management as a comprehensive village governance system. Another significant innovation is the application of governance technology, which refers to the implementation of social and institutional innovations through village regulations, Standard Operating Procedures, public service standards, performance-based monitoring systems, and institutional strengthening of the Village Waste Management Working Group. Consequently, the program not only promotes behavioural change but also establishes a sustainable institutional and policy framework capable of supporting long-term environmental governance beyond the completion of the community service project.

The urgency of this program is further reinforced by the considerable social capital available in Blahkiuh Village, including the active involvement of the village government, traditional village institutions, women's organizations, youth groups, community organizations, and strong local cultural values. Without immediate intervention, the continuous increase in waste generation will inevitably impose greater environmental and socio-economic burdens on the village. Conversely, by adopting an integrated, participatory, and culturally grounded waste management system, Blahkiuh Village has the potential to become a model of best practice for community-based environmental governance throughout Badung Regency. Therefore, this community service program is expected to strengthen community capacity, improve the quality of environmental public services, establish sustainable waste governance, and provide a replicable model for other rural communities facing similar environmental challenges.

2. IMPLEMENTATION METHOD

This community service program adopted a participatory, educational, and practice-oriented approach. The activities were conducted in Blahkiuh Village, Abiansema District, Badung Regency, Bali, with a primary focus on strengthening community empowerment and institutional governance at the TPS 3R (Reduce, Reuse, and Recycle Waste Processing Site). The location was selected based on the partner's existing challenges, including the low rate of household waste segregation, limited institutional capacity for waste management, and the need to establish an integrated waste management system rooted in local wisdom. The principal partners of this program were the Government of Blahkiuh Village and the TPS 3R management team, which play central roles in implementing village-level waste management services.

The program was designed as a community empowerment workshop, as this method enables effective knowledge transfer, interactive discussion, practical problem-solving, and institutional capacity building among participants. The workshop involved several competent resource persons representing different fields of expertise. These included specialists in organizational management, experts in solid waste management and environmental engineering, particularly those experienced in designing and operating waste-processing technologies and machinery, as well as tourism experts with extensive knowledge of sustainable tourism development and Balinese local wisdom. The multidisciplinary composition of the speakers was intended to ensure that waste management would not merely be understood as a technical sanitation issue but also as an integral component of village governance, community empowerment, environmental sustainability, and the preservation of local cultural values. This approach is consistent with the principles of collaborative governance, which emphasize multi-stakeholder participation in addressing complex public issues through shared decision-making and collective action [1]. The implementation process consisted of five sequential stages.

The first stage involved field observation. The project team conducted direct observations to assess the existing conditions of the TPS 3R facility, including waste management practices, available infrastructure, operational procedures, organizational performance, and the level of community participation. Particular attention was given to identifying challenges associated with waste segregation, collection, transportation, and processing. Conducting preliminary observations ensured that the community service activities were developed based on the actual needs of the community partners rather than on theoretical assumptions alone. As identified in the project proposal, the major challenges in Blahkiuh Village included inadequate household waste segregation practices, the absence of an integrated waste management system, and limited institutional capacity for managing community-based waste services.

The second stage consisted of problem identification. During this phase, qualitative data were collected through interviews with village government officials, TPS 3R managers, community leaders, and local residents involved in environmental activities. The objective was to identify priority issues concerning governance, institutional capacity, community participation, public service delivery, and program sustainability. The findings indicated that the principal challenges were not limited to technical aspects of waste management but also included the absence of village regulations, the lack of Standard Operating Procedures (SOPs), weak institutional arrangements, and limited public participation in waste segregation at the household level. These findings corresponded to the priority needs identified in the community service proposal, particularly those related to governance, public policy, community empowerment, and participatory environmental management.

The third stage involved the development of workshop materials. The training modules were prepared based on the findings from the observation and problem identification stages. The first module focused on organizational management, covering institutional structure, division of responsibilities, coordination mechanisms, administrative management, leadership, and organizational reporting systems. The second module addressed integrated waste management,

including waste segregation at source, waste reduction strategies, organic and inorganic waste processing, the application of appropriate waste-processing technologies and machinery, and the optimization of TPS 3R as the central facility for village waste management. The third module emphasized sustainable tourism, environmental conservation, and local wisdom, highlighting the contribution of proper waste management to maintaining a clean village environment, strengthening sustainable tourism, and preserving Balinese cultural values through the philosophy of Tri Hita Karana. Integrating local wisdom into environmental education was considered essential to ensure greater social acceptance and long-term sustainability of community participation.

The fourth stage was the implementation of the workshop. The workshop was attended by representatives of the Village Government of Blahkiuh, TPS 3R management personnel, village officials, women's organizations (PKK), youth organizations (Karang Taruna), community leaders, and local residents actively involved in environmental management. The activities consisted of expert presentations, interactive discussions, question-and-answer sessions, group work, simulations of institutional planning, and the preparation of follow-up action plans. Experts in organizational management introduced strategies for strengthening institutional governance and organizational effectiveness. Waste management specialists explained integrated waste processing systems, appropriate technologies, operational management of TPS 3R facilities, and innovations in waste-processing machinery. Tourism experts discussed the importance of maintaining environmental quality to support sustainable tourism while preserving the cultural identity and local wisdom of Blahkiuh Village. Through this multidisciplinary learning process, participants gained comprehensive knowledge of waste management from governance, technical, environmental, socio-cultural, and economic perspectives.

The fifth stage consisted of mentoring and evaluation. Following the workshop, continuous mentoring was provided to assist participants in implementing the knowledge acquired during the training, particularly in strengthening institutional management, improving waste segregation practices, enhancing operational procedures, and developing community-based monitoring mechanisms. Program evaluation was conducted using a structured questionnaire distributed to all workshop participants. The questionnaire was designed to assess participants' perceptions of the relevance and usefulness of the workshop materials, the quality of the resource persons, the applicability of the proposed strategies, and the extent to which the acquired knowledge could be implemented within the community. In addition, pre- and post-workshop assessments were administered to measure improvements in participants' knowledge, understanding, and readiness to implement integrated waste management practices. This evaluation approach is consistent with community empowerment principles that emphasize capacity building, behavioural change, stakeholder participation, and program sustainability [2].

Data collection throughout the community service program employed four complementary techniques: observation, interviews, documentation, and workshop implementation. Observation was conducted to examine the existing operational conditions of the TPS 3R facility and community waste management practices. Interviews were undertaken to obtain in-depth information from village government officials, TPS 3R managers, and community members regarding existing challenges, expectations, and proposed solutions. Documentation included photographs, attendance records, workshop materials, institutional documents, and records of discussion outcomes. The workshop itself functioned not only as a capacity-building activity but also as an interactive forum for knowledge exchange, collaborative problem-solving, and strategic planning for sustainable community-based waste management.

Overall, this implementation method positioned the community and institutional partners as active participants rather than passive beneficiaries. Through systematic observation, problem identification, material development, workshop implementation, mentoring, and evaluation, the program was designed to strengthen the institutional capacity of Blahkiuh Village and its TPS 3R in developing a more organized, participatory, and sustainable waste management system. The

principal innovation of this implementation model lies in the integration of organizational management training, waste management technology, sustainable tourism, and Balinese local wisdom into a single community empowerment framework. Unlike conventional community service programs that primarily emphasize technical waste management, this integrated approach simultaneously strengthens governance, institutional sustainability, community participation, and environmental stewardship, thereby creating a more comprehensive and sustainable model for village-based waste management.



Figure 1. Documentation of the Assistance Activities

3. RESULTS AND DISCUSSION

a. Research Results

The community service program was successfully implemented through a community empowerment workshop held at the Blahkiuh Village Office, Abiansema District, Badung Regency, with the participation of 50 participants consisting of village government officials, village administrative staff, TPS 3R Kubon Ampas Sari management personnel, environmental extension officers, community leaders, women's organizations (PKK), youth organizations (Karang Taruna), and representatives of community-based environmental groups. The workshop served as a collaborative learning platform designed to strengthen institutional capacity, improve organizational management, and reinforce community participation in sustainable waste management.

The workshop commenced with an opening session delivered by the Village Head of Blahkiuh, emphasizing the importance of community collaboration in maintaining environmental sustainability while preserving the village's cultural identity. Subsequently, three keynote speakers presented complementary perspectives. The first speaker, an expert in organizational management, explained the importance of strengthening institutional governance, organizational structure, leadership, communication, and collaborative decision-making in managing community-based waste management organizations. The second speaker, an environmental engineering practitioner specializing in waste management technologies, introduced appropriate technologies and operational strategies for TPS 3R, including waste segregation, compost production, recyclable material recovery, and the utilization of environmentally friendly waste-processing machinery. The third speaker, an

expert in sustainable tourism and Balinese local wisdom, discussed the strategic role of community-based waste management in preserving environmental quality, enhancing the attractiveness of rural tourism, and maintaining the cultural values embodied in the Tri Hita Karana philosophy.

Interactive discussions demonstrated that participants actively exchanged experiences regarding existing waste management challenges in Blahkiuh Village. Several issues were identified, including inconsistent household waste segregation, limited community awareness, insufficient institutional coordination, and the absence of standardized operational procedures. Through focus group discussions and participatory dialogue, participants jointly formulated practical solutions to strengthen institutional collaboration among the village government, TPS 3R management, community organizations, and local residents.

One of the most significant outcomes of the workshop was the increased understanding of organizational synergy in community-based waste management. Participants recognized that environmental sustainability cannot be achieved solely through technological improvements but also requires strong organizational commitment, effective communication, transparent governance, and active community participation. Furthermore, participants agreed that village regulations concerning waste management should be implemented consistently while ensuring fairness and maintaining positive relationships among all stakeholders.

To facilitate long-term implementation, the community service team developed several practical outputs, including a "Modern Teba" (Teba Modern) Guidebook explaining environmentally friendly household organic waste management practices adapted to local conditions, a Standard Operating Procedure (SOP) for TPS 3R Kubon Ampas Sari covering waste collection, segregation, processing, occupational safety, institutional coordination, and service standards, and scientific documentation prepared for publication in an accredited community service journal (SINTA 4). These outputs are expected to serve as practical references for village institutions and community members in maintaining sustainable waste management practices.

Evaluation was conducted through structured questionnaires administered to all workshop participants at the end of the activity. The evaluation assessed participants' satisfaction with the workshop, relevance of the training materials, competence of the speakers, applicability of the knowledge acquired, and participants' willingness to implement the proposed waste management strategies. Overall, participants expressed positive perceptions regarding the workshop, indicating that the activities were highly relevant to community needs and provided practical knowledge applicable to the daily management of TPS 3R and household waste.

The expected long-term outcome of the program is behavioural transformation within the community, particularly regarding waste segregation at the source, increased public participation in environmental activities, stronger institutional collaboration, and greater appreciation of local wisdom as the foundation of sustainable environmental governance. These behavioural changes are expected to contribute to a cleaner village environment, stronger community resilience, and enhanced public confidence in Blahkiuh Village as a model of community-based environmental management.

TAHAPAN PELAKSANAAN KEGIATAN PENGABDIAN KEPADA MASYARAKAT
(Pemberdayaan Komunitas Pengelolaan Sampah di TPS 3R Desa Blahkiuh)

No.	Tahapan Kegiatan	Tujuan	Kegiatan Utama	Metode/ Teknik	Output yang Dihasilkan	Pelaksana
1	Observasi Lapangan	Memperoleh gambaran kondisi TPS 3R dan fasilitas yang ada	• Observasi kondisi TPS 3R dan fasilitas yang ada • Mengamati alur pengelolaan sampah (pemilahan, pengumpulan, pengangkutan, pengolahan) • Mengidentifikasi tingkat partisipasi masyarakat	• Observasi langsung • Catatan lapangan • Dokumentasi (foto, video)	Data dan informasi kondisi eksisting sebagai dasar perumusan masalah dan penyusunan materi workshop.	Tim Pengabdian
2	Identifikasi Masalah	Mengidentifikasi masalah utama dan kebutuhan mitra terkait pengelolaan sampah.	• Wawancara dengan pemerintah desa, pengelola TPS 3R, dan masyarakat • Pemetaan masalah prioritas • Analisis akar masalah	• Wawancara • Diskusi kelompok • Analisis data	Daftar masalah prioritas dan kebutuhan mitra yang menjadi dasar penyusunan materi dan solusi.	Tim Pengabdian & Mitra
3	Penyusunan Materi Workshop	Menyusun materi workshop sesuai kebutuhan mitra dan hasil identifikasi masalah.	• Menyusun modul manajemen pengorganisasian komunitas • Menyusun materi penanganan sampah dan teknologi/mesin • Menyusun materi pariwisata dan kearifan lokal • Menyajikan media dan bahan workshop	• Studi literatur • Diskusi tim • Konsultasi dengan narasumber ahli	Modul dan materi workshop yang komprehensif dan sesuai kebutuhan mitra.	Tim Pengabdian & Narasumber
4	Pelaksanaan Workshop	Meningkatkan pengetahuan, kesadaran, dan kapasitas peserta dalam pengelolaan sampah berbasis komunitas.	• Pemaparan materi oleh narasumber (manajemen, penanganan sampah, teknologi/mesin, pariwisata & kearifan lokal) • Diskusi interaktif dan tanya jawab • Simulasi/penyusunan rencana tindak lanjut • Perumusan komitmen bersama	• Presentasi • Diskusi • Tanya jawab • Simulasi/FGD	Peserta memahami materi, memiliki rencana tindak lanjut, dan komitmen bersama.	Tim Pengabdian, Narasumber, & Mitra
5	Evaluasi dan Pendampingan	Menilai kebermanfaatan kegiatan dan memastikan implementasi hasil workshop.	• Pendampingan implementasi rencana tindak lanjut • Evaluasi melalui kuesioner • Analisis hasil dan rekomendasi perbaikan	• Kuesioner evaluasi • Diskusi tindak lanjut • Monitoring • Dokumentasi	Hasil evaluasi kegiatan, tingkat kepuasan peserta, dan rencana tindak lanjut yang dapat diimplementasikan.	Tim Pengabdian & Mitra

Keterangan: Seluruh tahapan dilaksanakan secara partisipatif dengan melibatkan Pemerintah Desa Blahkiuh, pengelola TPS 3R, perangkat desa, kelompok masyarakat (PKK, Karang Taruna), tokoh masyarakat, dan unsur terkait lainnya.

Figure 2. Stages of Community Service Implementation

b. Discussion

Interpretation of the Community Service Outcomes

The implementation of the community empowerment workshop in Blahkiuh Village demonstrated that strengthening institutional capacity is one of the most fundamental elements in developing a sustainable community-based waste management system. Although waste management is often perceived as a technical activity involving waste collection, sorting, transportation, and processing, the findings of this community service program indicate that organizational governance, stakeholder collaboration, and community participation play equally significant roles in determining the effectiveness and sustainability of waste management initiatives. The workshop successfully increased participants' understanding of the importance of organizational coordination, collective responsibility, and participatory decision-making in managing TPS 3R Kubon Ampas Sari.

One of the most meaningful findings was the emergence of a shared understanding among participants that waste management should no longer be viewed solely as the responsibility of the TPS 3R management team or the village government. Instead, it should become a collective responsibility involving all components of the community, including households, traditional village institutions, women's organizations (PKK), youth organizations (Karang Taruna), environmental volunteers, and local businesses. This finding reflects a shift in public perception from a government-centered approach toward a collaborative governance model that emphasizes shared responsibility and joint decision-making.

From the perspective of Collaborative Governance Theory, Ansell and Gash [1] explain that complex public issues cannot be effectively solved through hierarchical government intervention alone but require active collaboration among governmental institutions, civil society, and other stakeholders. The workshop demonstrated this principle by creating an interactive forum where village officials, TPS 3R managers, environmental facilitators, and community representatives jointly discussed existing challenges and formulated practical solutions. Such interactions strengthened mutual trust, enhanced communication, and encouraged participants to develop a shared commitment toward sustainable environmental governance.

The collaborative atmosphere established during the workshop also reduced institutional fragmentation that had previously limited communication among stakeholders. Before the implementation of the program, waste management activities tended to operate independently within different community groups. Following the workshop, participants recognized the importance of integrating institutional roles, coordinating responsibilities, and establishing standardized operational procedures that could be implemented consistently across the village. This outcome supports Ansell and Gash's argument that successful collaborative

governance depends upon face-to-face dialogue, mutual trust, institutional commitment, and shared understanding among stakeholders [1].

Another important finding concerns the enhancement of community empowerment. According to Community Empowerment Theory, empowerment is achieved when individuals and communities acquire the knowledge, skills, confidence, and opportunities necessary to influence decisions affecting their own lives [2]. Throughout the workshop, participants were not treated merely as recipients of information but were actively involved in discussions, problem identification, institutional planning, and action plan development. This participatory learning process significantly increased their confidence to contribute to waste management activities within their respective communities.

The workshop also demonstrated that community empowerment extends beyond knowledge acquisition. Participants developed stronger ownership of the TPS 3R program because they were directly involved in identifying institutional problems and designing practical solutions. Such ownership is essential for ensuring long-term program sustainability, as community members are more likely to maintain environmental initiatives when they perceive themselves as active stakeholders rather than passive beneficiaries.

The observed improvements in participants' understanding can also be interpreted through Rogers' Diffusion of Innovations Theory [3]. Rogers argues that innovations are adopted more rapidly when they provide clear advantages, are compatible with existing social values, are relatively simple to understand, can be tested on a limited scale, and produce observable results. The workshop incorporated these principles by presenting practical demonstrations of waste segregation, compost production, institutional management, and community coordination rather than relying exclusively on theoretical lectures.

Moreover, participants were able to observe successful examples of community-based waste management, making the proposed innovations easier to understand and replicate. The participatory workshop format also enabled participants to discuss potential barriers, adapt innovations to local conditions, and develop implementation strategies appropriate for Blahkiuh Village. Consequently, the diffusion process became more socially acceptable because innovations were introduced through dialogue rather than imposed through administrative directives.

A particularly significant aspect of this community service program was the integration of Tri Hita Karana into community-based waste management. Unlike conventional environmental education programs that primarily emphasize technical solutions, this workshop incorporated Balinese cultural values as an essential component of environmental governance. Tri Hita Karana promotes harmony among humans and God (Parhyangan), harmony among human beings (Pawongan), and harmony between humans and the environment (Palemahan) [4].

The Palemahan dimension was especially relevant because environmental cleanliness was interpreted not merely as an ecological responsibility but also as a cultural and spiritual obligation. Participants acknowledged that maintaining a clean village environment contributes to preserving the dignity of customary villages, supporting religious ceremonies, and strengthening the image of Blahkiuh as a culturally sustainable community. Consequently, waste management became closely associated with the preservation of local identity rather than simply reducing environmental pollution.

Similarly, the Pawongan dimension emphasized the importance of collective action and mutual cooperation (gotong royong). Participants recognized that effective waste management requires continuous collaboration among community members, village institutions, and local organizations. The strengthening of social solidarity observed during the workshop illustrates how local wisdom can function as social capital that supports environmental governance.

Another meaningful interpretation concerns organizational strengthening. The preparation of the Standard Operating Procedure (SOP) and the institutional guidebook contributed to improving governance quality by providing clear operational standards, defined institutional responsibilities, and measurable service procedures. Previous observations indicated that operational activities within TPS 3R often relied on informal practices and personal experience. The newly developed SOP established standardized procedures for waste collection, segregation, processing, occupational safety, reporting, and community services, thereby increasing organizational accountability and institutional professionalism.

The development of the Modern Teba Guidebook further strengthened community empowerment by introducing practical household waste management practices based on Balinese traditions. Instead of replacing local knowledge with external concepts, the guidebook revitalized traditional environmental practices through modern waste management principles. This approach illustrates how indigenous knowledge can complement contemporary environmental management rather than being viewed as incompatible with technological development.

Overall, the implementation of this community service program demonstrates that sustainable waste management cannot rely solely on physical infrastructure or technological innovation. Rather, long-term sustainability depends on strengthening institutions, improving organizational governance, enhancing community participation, fostering collaborative leadership, and integrating local cultural values into environmental management. The findings therefore confirm that community empowerment should be viewed as a comprehensive social transformation process rather than merely an educational intervention.

Comparison with Previous Studies and Theoretical Perspectives

The findings of this community service program indicate that strengthening institutional capacity through community empowerment workshops significantly contributes to improving collaborative waste management practices at TPS 3R Kubon Ampas Sari. These findings are consistent with recent studies demonstrating that community participation remains one of the most influential determinants of sustainable waste management systems. However, the present program extends previous approaches by integrating organizational strengthening, collaborative governance, sustainable tourism, and Balinese local wisdom into a single community empowerment framework.

Recent studies on community-based waste management have consistently emphasized the importance of community participation in reducing household waste generation. Research by Suryani et al. [5] reported that villages implementing participatory waste management programs experienced higher levels of household waste segregation than villages relying primarily on government-operated waste collection systems. Similar findings were reported by Rahman et al. [6], who concluded that institutional collaboration between local governments and community organizations substantially improves waste management efficiency and public compliance.

The outcomes observed in Blahkiuh Village support these findings. During the workshop, participants demonstrated increased awareness regarding household waste segregation and recognized the importance of institutional cooperation. Nevertheless, unlike previous studies that focused primarily on technical waste management interventions, the present community service program addressed organizational governance as the primary foundation for environmental sustainability.

Institutional strengthening became a critical component because previous observations revealed that technical facilities alone could not guarantee successful waste management. This finding corresponds with UNEP recommendations stating that ineffective institutional arrangements frequently become the principal obstacle to sustainable municipal waste management, even when adequate infrastructure has been provided [7].

The present findings also reinforce the concept of Collaborative Governance proposed by Ansell and Gash [1]. According to their framework, successful governance depends upon direct dialogue, trust-building, shared commitment, institutional design, and facilitative leadership. These elements were clearly reflected during the workshop implementation. Village officials, TPS 3R managers, environmental extension officers, community leaders, women's organizations, and youth groups actively exchanged ideas and jointly developed action plans. Such interactions created mutual trust and reduced institutional fragmentation that had previously limited coordination among stakeholders.

Similar conclusions were reached by Emerson and Nabatchi [8], who argue that collaborative governance should be viewed as a dynamic process involving principled engagement, shared motivation, and joint action. The workshop demonstrated these three components simultaneously. Principled engagement emerged through participatory discussions, shared motivation developed from common environmental concerns, and joint action materialized through the formulation of institutional commitments and Standard Operating Procedures.

Another significant finding concerns the role of community empowerment in encouraging behavioural transformation. Previous studies by Zimmerman [2] emphasized that empowerment involves increasing community capacity to influence decisions affecting collective well-being. The current workshop reflected this principle by positioning participants as co-creators of institutional solutions rather than passive recipients of information. Consequently, participants demonstrated stronger ownership of TPS 3R management and greater commitment toward implementing environmentally responsible behaviour.

This result is also supported by research conducted by Asteria and Heruman [9], which found that community participation becomes more sustainable when residents actively participate in identifying environmental problems and designing practical solutions. Their study concluded that empowerment programs should emphasize participatory learning instead of one-way educational approaches. The workshop implemented in Blahkiuh Village adopted precisely this strategy by facilitating discussions, simulations, institutional planning exercises, and collaborative problem-solving.

From the perspective of innovation adoption, the workshop findings correspond closely with Rogers' Diffusion of Innovations Theory [3]. Rogers argues that innovation adoption depends upon perceived usefulness, compatibility with local culture, simplicity, trialability, and observability. These characteristics were incorporated into the implementation process. Rather than introducing sophisticated technologies that might be difficult for rural communities to adopt, the workshop focused on practical waste segregation techniques, compost production, organizational management, and operational improvements that could be immediately implemented within TPS 3R Kubon Ampas Sari.

Furthermore, demonstrations of composting technologies, recyclable material recovery, and organizational management enabled participants to directly observe the benefits of improved waste management. Such experiential learning significantly enhanced participants' willingness to adopt recommended practices. Previous research by Kaza et al. [10] similarly concluded that demonstration-based environmental education is considerably more effective than conventional classroom lectures because participants can immediately observe tangible benefits.

An important distinguishing feature of this community service program is the incorporation of Tri Hita Karana into environmental governance. While many previous community service initiatives primarily emphasize technical aspects such as compost production, recycling, or waste bank management, the present program integrates environmental management with Balinese philosophical values. The concept of Tri Hita

Karana encourages harmonious relationships among humans, nature, and spirituality, thereby providing a culturally legitimate foundation for sustainable waste management.

Recent research by Ardika et al. [11] demonstrated that environmental conservation programs in Bali become more sustainable when they incorporate indigenous knowledge and customary institutions. Likewise, Windia and Dewi [12] argued that Tri Hita Karana provides an adaptive governance framework capable of integrating environmental sustainability with socio-cultural resilience. The present community service program supports these conclusions by demonstrating that local wisdom strengthens community acceptance of environmental initiatives and encourages collective responsibility.

Particularly relevant is the Palemahan dimension of Tri Hita Karana, which emphasizes harmony between humans and nature. During workshop discussions, participants increasingly recognized environmental cleanliness as an integral component of maintaining village identity, protecting customary spaces, supporting religious ceremonies, and enhancing tourism attractiveness. This cultural interpretation substantially strengthened participants' motivation compared with purely technical environmental campaigns.

Similarly, the Pawongan dimension encouraged stronger cooperation among community organizations. Waste management was no longer perceived as an individual obligation but rather as a collective social responsibility. Such findings indicate that local wisdom functions not merely as cultural heritage but also as social capital capable of improving collaborative governance and strengthening institutional resilience.

Another notable contribution of the present community service program concerns its support for sustainable tourism development. Previous studies generally examined waste management independently from tourism governance. However, Blahkiuh Village possesses considerable tourism potential based on Balinese culture, rural landscapes, and community traditions. Consequently, environmental cleanliness directly influences the village's attractiveness as a tourism destination. This finding aligns with research by UNWTO [13], which emphasizes that sustainable tourism depends fundamentally on effective environmental management and community participation.

Therefore, integrating TPS 3R management with village tourism development represents an innovative strategy rarely found in previous community service programs. Instead of considering waste management solely as an environmental activity, this program positions environmental cleanliness as an economic asset capable of enhancing village competitiveness and supporting sustainable local development.

Overall, comparison with previous studies demonstrates that the outcomes of this community service program are generally consistent with existing literature regarding community participation, collaborative governance, and community empowerment. Nevertheless, the principal novelty lies in integrating organizational strengthening, collaborative governance, community empowerment, sustainable tourism, and the Balinese philosophy of Tri Hita Karana into a comprehensive community-based waste management model. This multidimensional approach distinguishes the present program from conventional community service activities that generally focus on technical waste processing alone. Consequently, the program contributes not only to improving waste management practices but also to strengthening village governance, preserving local cultural values, enhancing environmental resilience, and promoting sustainable rural development.

Practical Implications, Strengths, Limitations, and Future Development

The implementation of this community service program generated several practical implications for Blahkiuh Village, particularly in strengthening institutional governance, improving environmental management, and enhancing community participation in sustainable waste management. Unlike conventional waste management initiatives that primarily emphasize technical improvements, the present program demonstrated that

strengthening organizational capacity and fostering collaboration among stakeholders constitute equally important factors in achieving long-term sustainability.

From the perspective of village governance, the workshop contributed significantly to improving institutional coordination among the Village Government, TPS 3R Kubon Ampas Sari, customary village institutions, community organizations, environmental volunteers, women's organizations (PKK), and youth organizations (Karang Taruna). The discussions conducted during the workshop encouraged participants to recognize that environmental management should become an integral component of village development planning rather than a standalone sanitation program. Consequently, environmental governance may become increasingly embedded within village policy, budgeting, and public service delivery.

For TPS 3R Kubon Ampas Sari, the preparation of Standard Operating Procedures (SOPs) represents one of the most valuable outcomes of this community service program. Prior to the implementation of the workshop, operational activities relied primarily upon practical experience and informal communication among managers. The newly developed SOP provides standardized guidance covering waste collection, household waste segregation, transportation procedures, waste processing, occupational health and safety, administrative reporting, institutional coordination, and service quality standards. Such standardization contributes to improving operational efficiency while simultaneously strengthening accountability and transparency within the organization.

Another important practical implication concerns community behavioural change. Throughout the workshop, participants demonstrated greater awareness that household waste segregation constitutes the initial and most critical stage of sustainable waste management. This behavioural transformation is expected to reduce the quantity of mixed waste transported to TPS 3R, improve the quality of recyclable materials, increase compost production from organic waste, and ultimately reduce the volume of waste disposed of in final landfill facilities. Similar findings have been reported in previous studies indicating that behavioural change achieved through participatory education generally produces more sustainable environmental outcomes than infrastructure-based interventions alone [5], [6].

The implementation of the Modern Teba Guidebook also provides considerable practical benefits for local households. Traditionally, the concept of teba has represented an important component of Balinese household environmental management, functioning as a space for managing organic household waste. However, rapid urbanization and changing settlement patterns have gradually reduced the application of traditional environmental practices. By introducing the concept of Modern Teba, the program revitalizes indigenous environmental knowledge while incorporating contemporary waste management principles, thereby enabling households to process organic waste more effectively without abandoning local cultural values.

From an economic perspective, improving waste segregation practices also creates opportunities for increasing the economic value of recyclable materials. Better separation of plastics, paper, metals, and organic waste enables TPS 3R managers to recover greater quantities of recyclable resources, thereby generating additional operational income that may contribute to the long-term financial sustainability of community-based waste management.

Furthermore, integrating environmental cleanliness with sustainable tourism development provides additional strategic benefits for Blahkiuh Village. Environmental quality has become an increasingly important determinant of tourism competitiveness, particularly in destinations emphasizing cultural heritage and rural experiences. Maintaining clean public spaces, effective waste management systems, and environmentally responsible communities not only improves public health but also enhances the overall attractiveness of the village for visitors. Consequently, waste management should be regarded not merely as an environmental obligation but also as a strategic investment supporting sustainable local economic development.

Another important implication concerns public policy development. The outcomes of this community service program provide practical evidence supporting the formulation of village regulations concerning waste management. Through stronger institutional arrangements, standardized operational procedures, and collaborative governance mechanisms, the village government is better positioned to develop policies that are socially accepted, operationally feasible, and environmentally sustainable. Such regulations are expected to strengthen legal certainty while encouraging greater community compliance with environmental responsibilities.

The present community service program also possesses several notable strengths. First, the multidisciplinary approach allowed participants to gain comprehensive knowledge from experts representing organizational management, environmental engineering, waste management technology, and sustainable tourism. Such integration enabled participants to understand waste management from governance, technical, socio-cultural, and economic perspectives simultaneously.

Second, the participatory implementation method significantly increased community ownership of the program. Rather than functioning merely as training participants, community members actively contributed to identifying problems, discussing institutional challenges, and formulating practical solutions. This participatory process strengthened collective commitment toward sustainable environmental governance.

Third, the incorporation of Tri Hita Karana distinguishes this program from many previous community service initiatives. Rather than introducing externally developed environmental concepts alone, the program successfully integrated Balinese cultural philosophy into modern waste management practices. This cultural approach enhanced community acceptance because environmental responsibility was interpreted as an extension of existing cultural and spiritual values rather than as an externally imposed obligation.

Despite these achievements, several limitations should be acknowledged. The primary limitation concerns the relatively limited implementation period. Community empowerment represents a long-term social transformation process requiring continuous mentoring, institutional strengthening, and behavioural reinforcement. Consequently, the short duration of the workshop limited opportunities to observe long-term behavioural changes within the community.

A second limitation relates to the socio-cultural context of Blahkiuh Village. As a Balinese customary village, community members frequently participate in religious ceremonies, customary meetings, and cultural events throughout the year. These activities occasionally affected participant attendance and reduced the amount of time available for intensive mentoring. Nevertheless, rather than being viewed solely as a limitation, this circumstance also highlights the importance of designing community empowerment programs that are compatible with local socio-cultural calendars and customary governance structures.

Another limitation concerns resource availability. The implementation of sustainable waste management requires continuous financial support, appropriate technological equipment, adequate operational infrastructure, and ongoing human resource development. While the present community service program successfully strengthened institutional capacity, long-term sustainability will depend upon continued support from village authorities, district government agencies, universities, and other strategic partners.

Looking forward, several opportunities exist for expanding the present program. Future community service activities may include digital monitoring systems for TPS 3R operations, development of household waste information systems, implementation of circular economy business models, expansion of community-based composting programs, and integration of environmental education into village schools. Such innovations would further strengthen institutional resilience while improving environmental performance.

The village may also establish partnerships with universities, private industries, environmental organizations, and tourism stakeholders to expand community participation and improve technological innovation. Collaborative research involving higher education institutions would facilitate continuous evaluation of environmental performance while supporting evidence-based policy development.

Finally, Blahkiuh Village possesses considerable potential to become a regional model for community-based waste management. Through sustained institutional strengthening, consistent implementation of Standard Operating Procedures, continuous public education, preservation of Tri Hita Karana values, and effective collaborative governance, TPS 3R Kubon Ampas Sari may serve as a demonstration site for other villages seeking to develop integrated community-based waste management systems. Such replication would contribute not only to improving environmental quality in Blahkiuh Village but also to supporting the broader agenda of sustainable rural development in Bali.



Figure 3:
Waste Segregation Practices and Odor Control in Waste Management

4. CONCLUSIONS

The implementation of the community service program in Blahkiuh Village successfully achieved its primary objective of strengthening community capacity in developing an integrated community-based waste management system through institutional strengthening, organizational capacity building, and collaborative governance. The workshop approach effectively enhanced participants' understanding of organizational management, sustainable waste management practices, and the importance of preserving local wisdom as the foundation of environmental governance. The active involvement of the Village Government, TPS 3R Kubon Ampas Sari, environmental extension officers, customary village institutions, women's organizations, youth organizations, and community representatives demonstrated that environmental management becomes more effective when implemented through collaborative and participatory approaches.

The principal outcome of this community service program is not merely the improvement of participants' knowledge but also the establishment of a stronger institutional foundation for sustainable waste management. The preparation of the Modern Teba Guidebook, the development of Standard Operating Procedures (SOPs) for TPS 3R Kubon Ampas Sari, and the strengthening of institutional coordination constitute strategic outputs that support the continuity of community-based environmental management. Furthermore, integrating the philosophy of Tri Hita Karana into waste management practices has strengthened community awareness that environmental conservation represents both an ecological responsibility and a cultural obligation that contributes to maintaining the identity and sustainability of Blahkiuh Village.

This program also demonstrates that strengthening organizational governance constitutes a strategic prerequisite for achieving sustainable environmental management. The collaboration established among village institutions, community organizations, and TPS 3R managers has created a more coordinated governance model capable of improving public participation and enhancing the effectiveness of waste management services. Consequently, the community service program contributes not only to improving environmental quality but also to strengthening local governance, public service delivery, and community resilience.

Practically, this community service program provides a replicable model of community empowerment that integrates organizational strengthening, collaborative governance, environmental education, sustainable tourism, and local wisdom into a comprehensive village-based waste management framework. This integrated approach represents an important contribution to the implementation of sustainable rural development while supporting the achievement of environmental sustainability goals.

For future development, continuous mentoring and monitoring are recommended to ensure the consistent implementation of the Standard Operating Procedures and institutional strengthening initiatives. The Village Government is encouraged to formalize waste management policies through village regulations, expand environmental education programs, strengthen partnerships with universities and relevant government agencies, and develop digital monitoring systems for TPS 3R operations. Future community service activities should also promote the integration of circular economy principles, eco-tourism development, and innovative waste processing technologies to further improve environmental performance and community welfare. Through sustained collaboration among all stakeholders, Blahkiuh Village has considerable potential to become a model village for community-based waste management in Bali and other regions of Indonesia

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