Journal of International SDGs Community Services
Volume 2 No. 01 (2026)

Community-Based Organic Waste Management: Observations from Canang Waste Processing at TPS3R Sire Angen Asri, Bali

Nadiati[1], Salsa Sinta Fatarani[2], Nabella Bunga Rastya[3,*], One Mayra Siti Nur Aisyah[4], Fitri Widyanita Yarisma[5]

[1] Digital Business, Economy and Business, Universitas PGRI Semarang, Indonesia
[2] Digital Business, Economy and Business, Universitas PGRI Semarang, Indonesia
[3] Digital Business, Economy and Business, Universitas PGRI Semarang, Indonesia
[4] Digital Business, Economy and Business, Universitas PGRI Semarang, Indonesia
[5] Digital Business, Economy and Business, Universitas PGRI Semarang, Indonesia
* Corresponding Author: nabellabungarastya@gmail.com

Abstract.
Bali continues to face increasing challenges in managing organic waste, particularly ceremonial waste generated from daily Hindu offerings such as canang sari. As one of the major sources of biodegradable waste, canang residues require effective community-based management to reduce environmental impacts and support sustainable waste practices. This study aims to describe the operational process and processing capacity of canang waste management at TPS3R Sire Angen Asri, Serangan Village, Denpasar Selatan, Bali. Field observations were conducted on 30 June 2026 as part of the International Community Service (ICS) 2026 program. Data were collected through direct observation, informal interviews with facility staff, visual documentation, and analyzed using descriptive qualitative analysis. The findings identified five sequential processing stages, including sorting, shredding, composting, maturation, and sieving to produce organic compost. According to information provided by facility staff, the facility receives approximately 5 tonnes of organic ceremonial waste daily, while only around 2 tonnes can be processed into compost, leaving an estimated 3 tonnes unprocessed. These findings indicate a processing capacity gap that may limit the effectiveness of community-based organic waste management. The study contributes practical insights into the operational challenges faced by village-scale waste processing facilities and highlights opportunities to strengthen community-based waste management through improved infrastructure, digital monitoring systems, and circular economy approaches. These efforts may also support the achievement of Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities) and SDG 12 (Responsible Consumption and Production).
Keywords: *Organic waste; Canang waste; Composting; TPS3R; Serangan; Bali; Circular economy.*

I. INTRODUCTION

Bali's daily religious practice generates a continuous and substantial volume of organic ceremonial waste, most visibly in the form of used canang sari, small offerings made of flowers, coconut leaf, and other natural materials presented multiple times a day at temples and households across the island. According to the Indonesian National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry, Indonesia

generated more than 33 million tonnes of waste in 2024, with approximately 39–40% consisting of organic waste, making biodegradable waste the largest component of the national waste stream.

Bali follows this pattern, where organic waste dominates municipal solid waste due to daily household activities and religious ceremonies, emphasizing the need for effective community-based organic waste management systems (SIPSN KLHK, 2024). A temple ceremony has been estimated to generate around 200 kilograms of temple waste in a single day, of which roughly 40% consists of leftover flowers, and researchers have estimated that about 45 tonnes of temple waste from 230 public temples across Bali could potentially be recycled each year (Wijaya et al., 2021). At a broader scale, total daily waste generation across Bali has been reported at around 4,281 tonnes, with roughly 60% classified as organic waste, a composition that includes food waste as well as the residues of daily religious offerings (Wijaya & Putra, 2021).

Because canang waste is predominantly organic, composting has repeatedly been identified in the literature as its most viable management pathway. Ceremonial waste, most of which is organic, has commonly been processed through composting, and its composition, dominated by organic material, makes it well suited to becoming compost (Wijaya & Putra, 2021). Community-level initiatives reflect this potential: household waste composition in Pemecutan Kaja Village, Denpasar, was found to consist of 41% organic waste and 25% religious ceremonial waste, most of it easily biodegradable material such as coconut leaves, palm fronds, and flowers, yet this ceremonial fraction is frequently left unseparated from ordinary household waste, reducing the efficiency of collection and processing (Vidyanidhi & Ismail, 2025). Educational interventions targeting this issue have also been documented, including composting training for canang waste conducted with elementary school students in Denpasar, aimed at building awareness of the waste cycle from an early age.

Beyond composting, several studies have explored alternative valorization pathways for temple and ceremonial waste as a way of addressing the volume problem more broadly. These include converting temple waste into refuse-derived fuel and organic incense as ways of preserving temple environments while creating economically viable products (Wijaya et al., 2021; Wiratama & Wijaya, 2024), as well as processing floral offering residue for natural dye extraction, which has similarly been explored as a means of reducing untreated flower waste from canang sari (Fitriana et al., 2025). A carbon-emission perspective has also emerged in recent research, examining temple waste management practices in Bali specifically for their potential to reduce carbon emissions amid rising visitor numbers and ceremonial frequency, with organic waste found to account for the large majority of waste generated at several temple sites studied (Wiratama & Wijaya, 2024).

Despite this growing body of research, most existing studies on Bali's ceremonial waste focus on large, well-known temple sites, or on waste composition and valorization technology in general. Comparatively little has been documented about how community-scale waste facilities, such as village-level TPS3R (Reduce-Reuse-Recycle Waste Processing Site) units, actually cope with the day-to-day volume of canang waste at the neighborhood level, particularly in coastal tourism villages where waste management competes for attention with other development priorities. Serangan Village, a coastal area in Denpasar Selatan known

primarily for sea turtle conservation and marine tourism, operates one such facility, TPS3R Sire Angen Asri, which processes organic waste, including canang residue, into compost. TPS3R Sire Angen Asri is a community-based waste management facility located in Serangan Village, South Denpasar, Bali.

The facility primarily processes biodegradable organic waste, including canang sari residues (flowers, coconut leaves, palm leaves, and other ceremonial plant materials), household organic waste, garden waste, and market organic waste collected from households, temples, traditional markets, tourism businesses, and community activities within Serangan Village and surrounding areas. Supported by the Denpasar City Government, Desa Adat Serangan, and the Ministry of Public Works and Housing (PUPR), TPS3R Sire Angen Asri plays an important role in reducing organic waste sent to landfill while producing compost for agricultural and landscaping purposes. This study addresses that gap by presenting direct field observations of the facility's processing capacity and operational challenges, conducted as part of the International Community Service (ICS) 2026 program, a collaborative KKN (Kuliah Kerja Nyata) initiative between Universitas Persatuan Guru Republik Indonesia Semarang (UPGRIS) and partner institutions.

Unlike previous studies that mainly discuss temple waste composition, composting techniques, or waste valorization technologies, this study contributes by providing direct field-based evidence of the operational capacity and limitations of a community-scale TPS3R in managing ceremonial organic waste. In addition, the study identifies the gap between incoming waste volume and processing capacity and proposes practical implications for strengthening community-based organic waste management through improved operational capacity, digital waste recording, and circular economy opportunities. These findings provide empirical insights that may support local governments and community organizations in improving sustainable organic waste management in tourism-oriented villages such as Serangan.

II. METHODS

This study employed a descriptive qualitative approach based on direct field observation. Data collection took place on 30 June 2026 at TPS3R Sire Angen Asri, located in Desa Adat Serangan, Kelurahan Serangan, Kecamatan Denpasar Selatan, Kota Denpasar, Bali. Three data collection techniques were used: (1) direct on-site observation of the waste receiving, sorting, and composting areas; (2) an informal, unstructured interview with facility staff regarding the volume of incoming canang waste and the proportion successfully processed into compost; and (3) visual documentation of the facility signage, shredding machinery, waste piles, and processed compost material. No weighing instruments, written facility records, or repeated-measures data were available to the researcher during the observation; consequently, all volume figures reported in this study reflect a single verbal estimate provided by facility staff and are explicitly flagged as such rather than presented as verified measurements.

The collected data were analyzed using a qualitative descriptive approach. Field notes, observation results, interview responses, and visual documentation were systematically organized and categorized according to the waste processing stages and operational conditions observed at the facility. The data were then interpreted through thematic analysis to identify key patterns related to

the composting process, processing capacity, and operational challenges. Finally, the findings were compared with previous studies on community-based organic waste management and ceremonial waste processing in Bali to strengthen the interpretation of the observed results.

III. RESULT AND DISCUSSION

Facility Overview and Processing Stages

TPS3R Sire Angen Asri operates as a village-level waste processing facility supported by PUPR (Ministry of Public Works and Housing), Desa Adat Serangan, and the Denpasar City Government (Figure 1). Field observation identified five sequential stages in the transformation of canang waste into finished compost: (1) sorting, in which organic canang material is separated from non-organic elements such as staples, plastic wrapping, and rubber bands; (2) shredding, in which sorted organic material is reduced in size using a mechanical shredder (Figure 2); (3) composting, in which shredded material is mixed with decomposing agents to accelerate microbial breakdown; (4) maturation, in which the mixture is left to decompose until its texture, color, and odor resemble finished soil (Figure 3 and Figure 4); and (5) sieving, in which mature compost is screened to produce a uniform product ready for use as plant fertilizer. This sequence is broadly consistent with composting methods described in prior studies of ceremonial waste processing, which similarly rely on sorting, size reduction, and controlled decomposition using local microorganism additives to modify pH, temperature, and organoleptic qualities of the resulting compost (Sari et al., 2024).



Figure 1. Signage of TPS3R Sire Angen Asri, Desa Adat Serangan, Kelurahan Serangan, Kecamatan Denpasar Selatan (field documentation, 30 June 2026)



Figure 2. Facility staff and the mechanical shredder used in the size-reduction stage of canang waste processing (field documentation, 30 June 2026)



Figure 3. Piles of sorted organic waste undergoing maturation alongside unsorted incoming waste bags (field documentation, 30 June 2026)



Figure 4. Close-up of maturing compost material derived from canang waste, showing decomposed floral and leaf residue (field documentation, 30 June 2026)

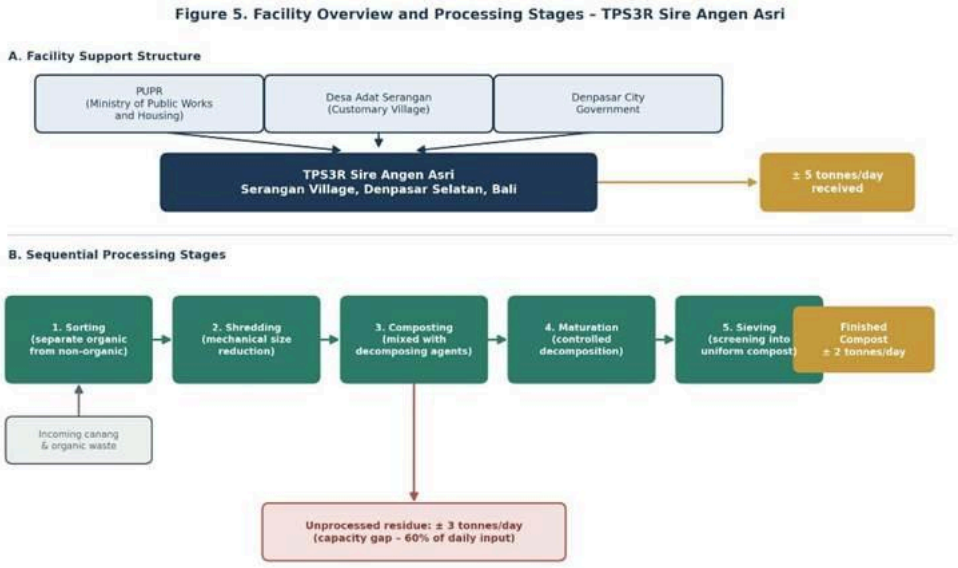


Figure 5. Facility overview and processing-stage flow diagram, showing the supporting institutions, the sequence of five processing stages, and the daily waste volumes at each point in the process (based on field observation and facility staff estimates, 30 June 2026)

Processing Capacity and the Observed Gap

According to facility staff, TPS3R Sire Angen Asri receives approximately 5 tonnes of canang waste per day, of which only around 2 tonnes can be processed into finished compost, leaving an estimated 3 tonnes unprocessed daily. This figure was obtained solely through verbal explanation during the site visit and was not independently verified through weighing records, facility logs, or repeated measurement; it is therefore reported here as an unverified field estimate rather than a confirmed statistic.

Table 1. Summary of daily waste processing capacity at TPS3R Sire Angen Asri (based on facility staff estimate, 30 June 2026)

Category	Volume (Tonnes/Day)	Share Of Incoming Volume
Limbah Masuk (Incoming Waste)	± 5	100%
Limbah Terolah (Processed Waste)	± 2	~40%
Limbah Belum Terolah (Unprocessed Waste)	± 3	~60%
Persentase Kapasitas Pengolahan (Processing Capacity Percentage)	–	**≈ 40%**

If accurate, this would indicate that the facility's current processing capacity absorbs only around 40% of the daily incoming volume — a considerably larger daily throughput than the per-ceremony figures reported for individual temples in earlier studies, though direct comparison is limited by differing units of measurement (per-ceremony versus per-day) and the absence of standardized reporting across facilities.

This capacity gap is not without precedent in the broader literature on Bali's ceremonial waste. Existing research on flower waste from canang sari has noted that if left unmanaged, the growing volume of ceremonial waste will pollute the surrounding environment, and that waste generated from temples is typically only collected and transported to landfills without further processing because appropriate waste management efforts have not yet been developed, particularly in regions with high daily ceremonial intensity (Fitriana et al., 2025). The pattern observed at Sire Angen Asri, a facility that has adopted composting but cannot fully absorb incoming volume, suggests a partial, rather than complete, solution to this documented problem: composting infrastructure exists, but its scale has not kept pace with demand.

Observed Operational Challenges

Beyond the volume gap, field observation identified two additional constraints. First, technical explanations available from on-site staff were limited, meaning much of the researcher's understanding of the process relied on visual observation rather than detailed verbal explanation, a limitation that itself reflects the facility's minimal capacity for structured visitor education. Second, no digital tracking, signage explaining the process to visitors, or structured educational program for volunteers and visitors was observed at the facility, despite Serangan's status as a coastal tourism and conservation destination that regularly receives outside visitors).

Discussion: Toward Closing the Gap

From a Digital Business perspective, the capacity gap identified at Sire Angen Asri suggests two directions worth further investigation, though neither was implemented or tested as part of this study. First, simple digital tracking of incoming and processed waste volumes, even a basic logbook or spreadsheet system, could convert the current reliance on staff recollection. into verifiable operational data, which would in turn support more accurate capacity planning and funding proposals. Second, the unprocessed fraction of canang waste (an estimated 3 tonnes per day, if the

staff estimate holds) represents an underutilized resource that circular-economy approaches documented elsewhere in Bali, such as converting temple floral waste into refuse-derived fuel, incense, or natural dye, suggest could be partially redirected toward value-added products rather than left as unprocessed residue (Wijaya et al., 2021; Fitriana et al., 2025). Prior studies have noted that organic waste more broadly has the potential to be used as an alternative fuel source, compost fertilizer, and an ingredient in building materials, indicating that composting need not be the facility's only processing pathway (Wijaya et al., 2023). These directions are offered as recommendations for future study and pilot testing, not as findings of this observation included in the manuscript must be properly cited and integrated with analysis or justification related to the community engagement programs/activities. They should all be relevant to the study.

IV. CONCLUSION

Field observation at TPS3R Sire Angen Asri, Serangan Village, found that the facility has established a functioning five-stage composting process for canang offering waste but faces a substantial capacity gap: an estimated 5 tonnes of waste received daily against roughly 2 tonnes processed, based on an unverified staff estimate. This gap appears consistent with broader, previously documented patterns of ceremonial waste in Bali outpacing available processing infrastructure. The facility would benefit from expanded processing capacity, structured technical support for staff, verified record-keeping of waste volumes, and a formal educational program for visitors and volunteers. Future research should prioritize obtaining verified, weighed waste volume data over time, as the primary limitation of this study is its reliance on a single, unverified verbal estimate rather than measured records.

V. ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the management and staff of TPS3R Sire Angen Asri, Desa Adat Serangan, Denpasar Selatan, Bali, for their cooperation, valuable information, and assistance during the field observation conducted as part of the International Community Service (ICS) 2026 program. The authors also acknowledge Universitas PGRI Semarang and all partner institutions involved in the ICS 2026 program for providing the opportunity and support to conduct this community-based field study.

REFERENCES

Fitriana, A. S., Rahayuningsih, E., & Cahyono, R. B. (2025). *Manajemen Pengelolaan Limbah Bunga Pacar Air (Impatiens Balsamina) dari Canang Sari dan Penetapan Waktu Pengumpulan*. *HEXAGON Jurnal Teknik dan Sains, 6*(2).

Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. (2024). *Sistem Informasi Pengelolaan Sampah Nasional (SIPSN): Capaian pengelolaan sampah tahun 2024*.s

Sari, N. P. N. A., Mahayana, I. M. B., Posmaningsih, D. A. A., & Indayani, I. (2024). *Pengaruh Mikroorganisme Lokal (MOL) Nasi Basi terhadap Kualitas Fisik Kompos Sampah Organik*. *Jurnal Kesehatan Lingkungan*, Poltekkes Kemenkes Denpasar.

Tapa, I. G. F. S., Suputra, I. P. K., Wahyuna, I. M. D., Kumara, I. N. I., Indrashwara, D. C., & Putri, A. A. A. R. A. (2026). *Peningkatan Kapasitas Masyarakat dalam Pengelolaan Sampah Organik Rumah Tangga melalui Pelatihan dan Pendampingan Eco-Enzyme di Kelurahan*

Serangan, Kota Denpasar. *To Maega: Jurnal Pengabdian Masyarakat, 9*(2), 340–349. https://doi.org/10.35914/w7w4y743

Vidyanidhi, P. C., & Ismail, Y. (2025). *Pengelolaan Sampah Upacara Keagamaan di Desa Pemecutan Kaja, Denpasar: Kajian Komposisi, Timbulan, dan Perilaku Masyarakat*. *Jurnal Bali Membangun Bali, 6*(3), 211–219. https://doi.org/10.51172/jbmb.v6i3.476

Wijaya, I. M. W., & Putra, I. K. A. (2021). *Potensi Daur Ulang Sampah Upacara Adat di Pulau Bali*. *Jurnal Ecocentrism, 1*(1). https://doi.org/10.36733/jeco.v1i1.1763

Wijaya, I. M. W., Ranwella, K. B. I. S., Revollo, E. M., Widhiasih, L. K. S., Putra, P. E. D., & Junanta, P. P. (2021). *Recycling Temple Waste into Organic Incense as Temple Environment Preservation in Bali Island*. *Jurnal Ilmu Lingkungan, 19*(2), 365–371. https://doi.org/10.14710/jil.19.2.365-371

Wijaya, I. M. W., Ranwella, K. B. I. S., Revollo, E. M., Widhiasih, L. K. S., Putra, P. E. D., & Junanta, P. P. (2023). *Refuse Derived Fuel Potential Production from Temple Waste as Energy Alternative Resource in Bali Island*. *Journal of Ecological Engineering, 24*(4), 288–296.

Wiratama, I. G. N. M., & Wijaya, I. M. W. (2024). *Study on Temple Waste Management and its Potential for Reducing Carbon Emission*. *Revista de Gestão Social e Ambiental, 18*(4), e06684. https://doi.org/10.24857/rgsa.v18n4-103

Wiratama, I. G. N. M., Maharani, S. E., Putri Anjani, N. K. A., Mardika, M., Rustini, N. M., Partiwi, N. L. P. G., & Wijani, N. P. (2023). *Pelatihan Pembuatan Kompos Dari Canang Sari di SD Saraswati 6 Denpasar, Bali*. *Lumbung Inovasi: Jurnal Pengabdian kepada Masyarakat, 8*(4), 815–825. https://doi.org/10.36312/linov.v8i4.1490