IAPA 2025 Hybrid Annual Conference & Congress
INDIGESNOUS PUBLIC ADMINISTRATION
ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

Sustainable Waste Management Model in Bali: Integration of Public Policy and Local Wisdom

[1]Ni Kadek Ariati, [2]Gede Wirata, [3]I Wayan Astawa

[1,2,3] Departement of Public Administration,
Faculty of Social Science and Humanities, Ngurah Rai University, Indonesia
Email: dekariati01@gmail.com

Abstract

Waste management is one of the most pressing environmental challenges in Bali, along with increasing tourism activities and population density. This research aims to analyze how local wisdom applied through customary instruments such as awig-awig and pararem can be integrated into public policies to create sustainable waste management. The method used is qualitative descriptive based on literature studies and secondary case studies that examine various customary-based waste management practices in Bali. Data were collected through the analysis of policy documents, activity reports, and previous research results, and analyzed using the Miles and Huberman models. This study found four main things: (1) the application of pararem and customary sanctions to increase community discipline in sorting and processing waste; (2) synergy between customary institutions and local governments through community-based management programs to strengthen the implementation of formal policies; (3) the values of Tri Hita Karana play a role as a moral foundation that fosters collective environmental awareness; and (4) collaboration between actors within the framework of collaborative governance encourages the formation of an adaptive and sustainable management system. Practically, this research provides an understanding of the importance of the role of indigenous villages in supporting local value-based waste management policies, while academically adding insight into the integration of local wisdom in public policies in the environmental sector.

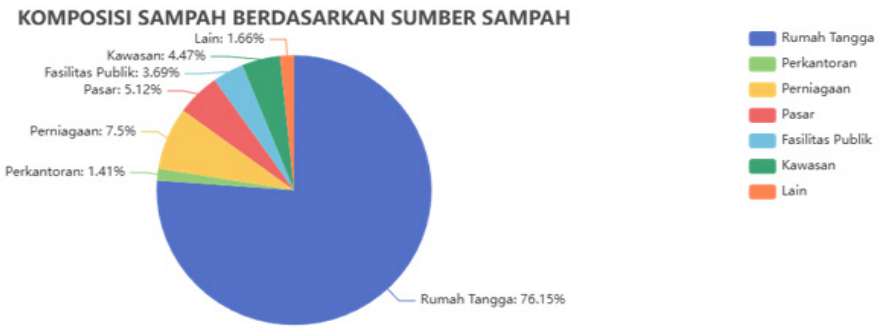
Keywords: collaborative governance; local wisdom; public policy; waste management

INTRODUCTION

Waste is one of the most pressing environmental problems in Bali Province that has a direct impact on environmental quality, public health, and Bali's image as an international tourism destination. Population growth, urbanization, and increasing number of tourists cause the volume of waste generation to continue to increase every year. Based on data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry in 2024, waste generation in Bali will reach around 1.2 million tons per year, with the largest composition coming from food waste (67%), followed by polluted paper (14%) and plastic packaging (11%) (Jaipakdee et al., 2025). The main sources of waste include households, markets, public facilities, and tourist areas, which demonstrate the complexity of management in areas with diverse socio-economic and cultural characteristics.

The Bali Provincial Government has issued a number of formal policies, such as restricting single-use plastics and implementing source-based waste management. However, the effectiveness of the implementation of the policy is still uneven between regions. Some communities still face limited facilities, knowledge, and discipline in waste sorting, so topdown policies often do not run optimally at the grassroots level. This condition shows that there is a gap between formal policies and the reality of implementation in society.

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332



Source: SIPSN KLHK, 2024

In the socio-cultural context of Bali, local wisdom such as the Tri Hita Karana philosophy and traditional instruments in the form of awig-awig and pararem have great potential to strengthen the effectiveness of waste management policies. Through customary regulations, communities have social mechanisms that encourage discipline, a sense of collective responsibility, and the preservation of cultural values in maintaining the cleanliness of the environment.

The formulation of the problem in this study is: How can customary instruments (awig-awig and pararem) be integrated with formal government policies to improve community compliance in waste sorting and management in Bali?

To answer these problems, an approach that is able to bridge formal policies with the socio-cultural values of the community is needed. In analyzing waste governance in Bali, this study is based on the framework of Collaborative Governance (Ansell & Gash, 2008) which emphasizes the importance of cooperation across government, community, and private sector actors in addressing complex public issues. This framework is combined with the concept of Tri Hita Karana as a representation of Balinese local wisdom that balances human relationships with God, others, and the environment. The integration of these two approaches is the basis for understanding how waste management policies can run effectively through the synergy between formal regulations and customary values that live in communities.

Based on this formulation, this study aims to analyze waste management innovations based on local wisdom in Bali and examine how traditional values can be adapted into formal public policies. Theoretically, this research contributes to the enrichment of the concept of collaborative governance in the context of local culture, while practically, the results are expected to be a reference for the development of participatory, adaptive, and sustainable waste management policy models.

Previous research on waste management in Bali has focused mainly on formal policies and infrastructure, with limited discussion on how indigenous institutions influence public compliance. This study addresses that gap by examining how *awig-awig* and *pararem* can be integrated into government policy to build a culturally grounded waste management system. The research contributes to a deeper understanding of how local wisdom strengthens policy legitimacy and public participation in sustainability efforts.

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

METHODS

This study uses a descriptive qualitative approach with a literature study method. This approach was chosen to gain a deep understanding of waste management practices based on local wisdom in Bali through analysis of various relevant secondary sources. The data used in this study is sourced from policy documents, official government reports, and academic literature that discusses the relationship between customary values, public policy, and environmental management.

Data sources include publications from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry in 2024 which contains information on the generation, composition, sources, and achievements of waste management in Bali. In addition, regional policy documents such as the Governor of Bali Regulation No. 97 of 2018 on the restrictions of single-use plastics and Bali Governor Regulation No. 47 of 2019 on source-based waste management. Other scientific literature used includes books, journal articles, and research results that discuss local values such as Tri Hita Karana and Sad Kerthi which are the basis of the Balinese people's philosophy in maintaining harmony with the environment. The selection of literature was carried out purposively, taking into account the relevance, credibility, and novelty of the source.

Data analysis is carried out using content analysis techniques with stages of data reduction, data presentation, and conclusion drawn. The reduction process is carried out by selecting information that is in accordance with the focus of the research, namely the integration of local wisdom values in waste management. Furthermore, the data is presented in the form of a thematic narrative that highlights the relationship between formal policies and customary values, then conclusions are drawn to identify patterns and concepts that emerge from the results of the study.

The validity of the study results is strengthened through triangulation of sources, namely by comparing various documents and literature from official institutions and credible scientific publications. This approach ensures that the analysis carried out has a strong, logical, and academically accountable basis.

RESULTS AND DISCUSSION

1. Generation and Composition of Waste in Bali

The volume of waste generation in Bali is very high every day, in line with the growth of the population and tourism sector. Waste management is becoming an increasingly urgent global challenge due to population growth, urbanization, and industrialization (Rahmatulloh et al., 2025). Based on data from the National Waste Management Information System (SIPSN) in 2024, Bali Province produces more than 3,400 tons of waste per day, or the equivalent of around 1.2 million tons per year. This figure reflects that although Bali is a province with a relatively small area, the rate of waste generation is very high. This condition is closely related to population density in urban areas and the intensity of tourism activities. According to Yaelagi (in Asmal, 2023), population growth and rapid urbanization produce large volumes of urban solid waste, which can threaten the health of soils, water, plants, and human systems.

Data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry in 2024 shows that waste generation in Bali is very significant and varies between districts or cities as shown in the following Table 1:

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

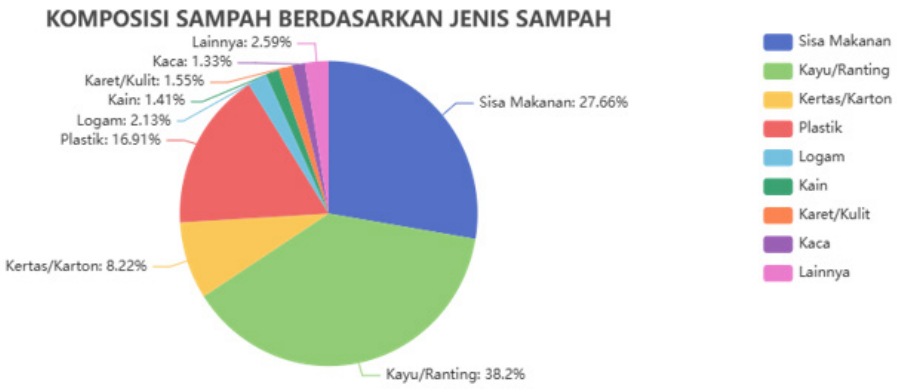
Table 1. Bali Province Waste Generation Data in 2024

No.	Regency/City	Daily Generation (tons)	Annual Generation (tons)
1.	Jembrana Regency	164,28	59.962,20
2.	Badung Regency	547,43	199.810,15
3.	Gianyar Regency	562,02	205.137,00
4.	Klungkung Regency	111,38	40.654,25
5.	Bangli Regency	113,86	41.557,88
6.	Karangasem Regency	281,22	102.643,48
7.	Buleleng Regency	413,37	150.880,05
8.	Denpasar City	1.004,95	366.806,75

Source: SIPSN KLHK, 2024

Based on this data spatially, Denpasar City is recorded as the largest contributor of waste with an average volume of 1,004.95 tons per day. This figure is far above other districts, considering that Denpasar is the center of government, education, and economic activity. Followed by Gianyar Regency which produces around 562.02 tons per day, and Badung Regency which produces 547.43 tons per day. These two regions are the epicenters of tourism, so it is not surprising that the generation of waste is very high.

Meanwhile, other regions such as Buleleng Regency contributed around 413.37 tons per day, Karangasem Regency 281.22 tons per day. The districts with relatively lower revenue are Bangli, Klungkung, and Jembrana, but when combined, the contribution remains significant in the total provincial revenue.



Source: SIPSN KLHK, 2024

In terms of composition, waste in Bali is dominated by organic waste in the form of food scraps, leaves, and twigs, which accounts for around 60–65% of the total generation. Meanwhile, inorganic waste, including plastic, paper, metal, glass, fabric, and other materials, ranges from 30–35%. Among inorganic waste, plastic occupies the most dominant position, which is around 13%. This fact is important to note considering that plastic takes a long time to decompose and has great potential to pollute the environment, both on land and at sea. Studies in Nepal also show seasonal variations in

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

household organic waste production, confirming the relevance of similar patterns in Bali (Lohani et al., 2025). This indicates that the production of organic waste, which is mostly sourced from household waste, causes waste production to increase.

Tourism also contributes significantly to the economies of many countries, one of which is Indonesia and especially Bali. When a region with traditional agricultural employment and suitable land, land, and labor changes its economic development strategy to promote industries and services such as tourism, the contribution of the agricultural sector decreases while the contribution of other sectors increases. However, the growth of tourism also increases waste and has various impacts on the environment (Dang & Dang, 2025). However, the limitation of processing infrastructure makes the waste system in Bali even more stressed, especially with capacity problems at the main landfill.

Thus, SIPSN data shows that although organic waste still dominates generation in Bali, the increasing volume of plastic waste is a serious threat, especially because its growth rate is in line with tourism growth. This pattern emphasizes the need for innovative and sustainable waste management, which is able to integrate modern infrastructure capacity with local wisdom practices that have taken root in Balinese society.

2. Waste Management Innovation in Bali

Waste management efforts in Bali in recent years have shown a paradigm shift, from just collecting waste to a more innovative, participatory, and sustainable system. This is in line with the mandate of Law No. 18 of 2008 on Waste Management and Bali Governor's Regulation No. 47 of 2019 on Source-Based Waste Management. The policy emphasizes the importance of reducing waste from the source through the 3R (Reduce, Reuse, Recycle) approach. According to Rahman (2024), waste can be managed and controlled through 3R processes, such as reduce, reuse, and recycle. Researchers are seeking to replace synthetic and plastic materials by developing green composites reinforced with natural fibers and recycling solid waste into useful materials.

The application of the 3R principle in Bali takes various forms. The practice of reduce is realized by restricting single-use plastics in Bali which is expected to reduce plastic consumption in the modern market by 30% by 2025. The reuse program is growing through community initiatives that encourage the use of refillable containers, cloth shopping bags, and refill station systems. Meanwhile, recycling is carried out through processing units that convert inorganic waste into new products of economic value, such as crafts made from recycled plastic or paving blocks from residual waste.

In addition, Bali is also known for strengthening Waste Banks and TPS3R (Reduce, Reuse, Recycle Waste Processing Sites) at the village and banjar levels. The Waste Bank functions not only as a place for collection and sorting, but also as a means of circular economy education. People can save inorganic waste that has been sorted, then converted into economic value. Meanwhile, TPS3R is an extension of the local government to manage waste at the community level, reduce the burden on landfills, and strengthen collective awareness.

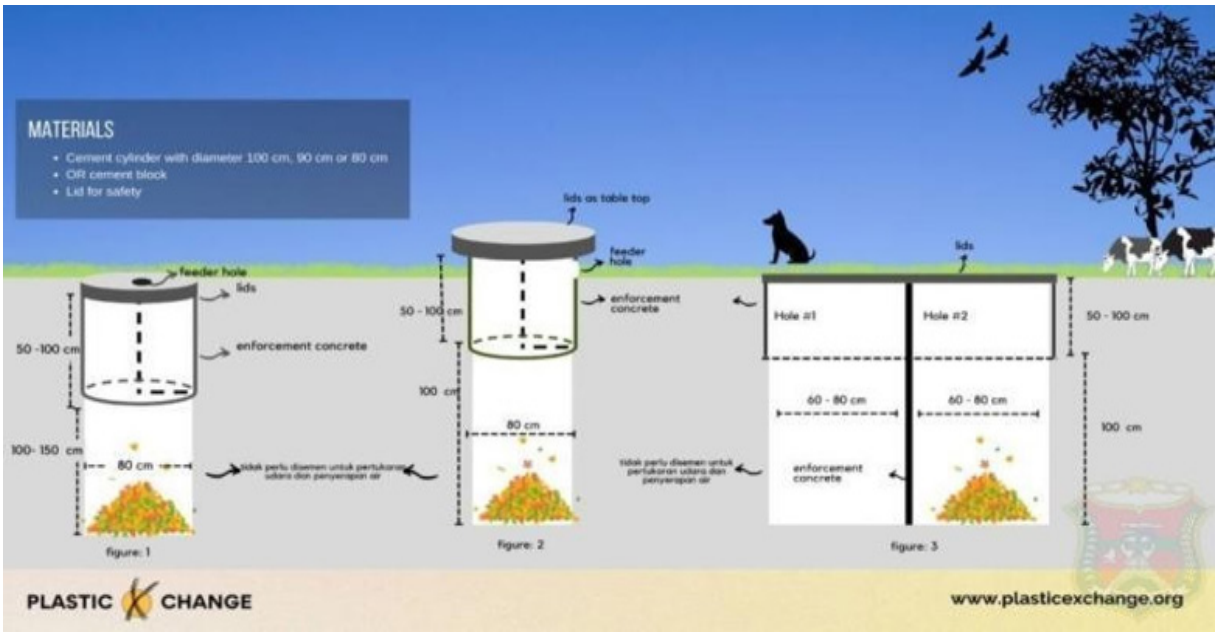
In terms of technology, various local innovations have also begun to emerge. One of the things that is growing rapidly is the manufacture of eco-enzymes, an environmentally friendly liquid from fermented household organic waste that can be used as natural cleaners, liquid fertilizers, and pest control. Another innovation is the use of Black Soldier Fly (BSF) maggots to decompose organic waste,

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

especially food scraps, into larval biomass that can be used as animal feed and organic fertilizer. In addition, modern composting methods based on aerobic composter and bio-reactor technology have also begun to be applied, especially by tourist villages who want to reduce waste generation while producing value-added products for the community.

Source: ZonaEBT.com, 2024

No less interesting is the development of Teba Modern, which is an adaptation of local Balinese wisdom that has long used yard land as a place to process organic waste. If in the traditional concept of teba only functions as a simple disposal and composting area, then in the modern version it is designed more systematically: organic waste is sorted, then processed through the rapid composting method or the use of maggots, and the results are reused to support yard farming. This Teba Modern model not only maintains the continuity of local culture, but also presents an environmentally friendly, inexpensive, and household-based solution. This innovation has even begun to be adopted by a number of indigenous villages as part of a source-based waste management strategy.



Source: DLHK Mamujukab, 2024

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

No less important is the digitalization aspect in waste management. A number of district/city governments in Bali have begun to develop waste reporting applications that allow residents to report waste accumulation points, access transportation schedules, or monitor the performance of TPS3R. This digitalization is a form of information technologybased public service innovation that supports the principles of transparency and accountability.

These innovative practices reflect that waste management in Bali no longer relies solely on local governments as a single actor, but is the result of multi-stakeholder collaboration: the government, communities, indigenous communities, the private sector, and universities. Innovations in waste management also emphasize the importance of integration between local wisdom such as the tradition of mutual cooperation, the traditional prohibition of littering, and the concept of teba with modern technology that is more efficient. Local governments play a role as facilitators, particularly in providing infrastructure and regulatory support that enables multi-stakeholder participation, building mechanisms for sharing information and feedback on issues, and encouraging the participation of various entities in digital collaborative governance of waste management. The public and the company participate as supervisory and enforcement entities. In addition, the application of technology plays an important role in waste management (You et al., 2024).

Source: Liputan6.com, 2023

Thus, waste management innovations in Bali not only answer the technical challenges of waste generation management, but also become a model of social transformation towards a more environmentally conscious society. These practices show how public policy can combine with community creativity to create sustainable, resilient, and effective waste management systems.

Technological innovation also plays an important role in improving waste management in Bali. Digital applications, community-based monitoring tools, and small-scale composting machines help increase efficiency and transparency. These technologies complement traditional practices, showing that modern systems and local wisdom can operate together. However, without continuous investment, many of these initiatives remain limited in scope and sustainability.

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

3. The Role of Traditional Villages and Local Wisdom

In the Balinese context, waste management cannot be separated from the role of traditional villages as socio-cultural institutions that have strong authority in people's lives. Customary villages function not only as traditional government entities, but also as social actors that internalize the values of local wisdom into environmental management practices. This makes customary villages as governance actors who are able to connect social legitimacy with sustainable environmental governance. Philosophically, the environmental governance system in Bali is rooted in the concept of Tri Hita Karana, which emphasizes the harmony of human relationships with God (parhyangan), fellow humans (pawongan), and nature (palemahan). This philosophy forms the view that maintaining the cleanliness of the environment is not just a technical obligation, but is part of a spiritual responsibility to maintain a balance in life (Geria et al., 2023).

In addition to philosophy, customary institutional rules are also an important foundation. Through awig-awig or pararem, traditional villages set strict norms related to environmental behavior, including the prohibition of littering. These rules are often accompanied by social sanctions and customary fines, making them more effective in fostering community compliance. The advantage of this system is the existence of cultural legitimacy that makes the community more obedient than if it only relies on formal government regulations.

Collective practices based on mutual cooperation are also still very strong in the life of traditional villages. The tradition of volunteering for the common good is often manifested in environmental cleanup activities, both in temples, banjar halls, and residential areas. Similarly, the subak system, which is basically a water management organization, also applies the principles of environmental cleanliness in rice fields and irrigation canals. These forms of togetherness show how Balinese local wisdom plays a role in building collective awareness to protect the environment from waste generation.

Some traditional villages have even become successful examples in integrating cultural values with waste management innovations. Penglipuran Traditional Village in Bangli is known as one of the cleanest villages in the world thanks to its strict waste sorting system, supported by the full participation of its citizens. In Penglipuran Traditional Village, a waste sorting system is implemented involving all indigenous peoples, where organic waste is processed into compost and inorganic waste is recycled.

Then in the Pererenan Traditional Village in Badung, a waste bank system is implemented that is integrated with traditional activities, thereby increasing citizen awareness while providing economic benefits. Meanwhile, Ubud in Gianyar develops synergy between traditional villages, tourism actors, and local communities in reducing plastic waste while promoting the image of environmentally friendly tourism.

Customary sanctions are moral and social, such as shame sanctions, social exclusion, or customary fines (pecalang fines). According to Asmal (2023), this mechanism works because it has a strong social legitimacy that people obey not because of fear of formal punishment, but because of fear of losing honor in the eyes of the community. On the other hand, administrative sanctions such as fines or formal reprimands are often ineffective due to weak oversight and low public ownership of formal government policies.

Although traditional villages play an important role in waste management, there are a number of challenges that need to be considered. First, there is tension between modernization and customary

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

rules. Not all young generations obey the pararem or awig-awig that regulates environmental behavior. Consumptive lifestyles and reliance on single-use products often clash with traditional values that emphasize simplicity and balance.

Second, the tourism sector, which is the engine of Bali's economy, is sometimes not fully in line with the rules of customary villages. Many tourists do not understand local norms related to environmental cleanliness, so the practice of littering is still found in tourist areas. This poses a dilemma: on the one hand tourism brings in foreign exchange, but on the other hand creates a large waste burden and is difficult for indigenous villages to control.

Third, there is a limitation in the capacity of customary villages, both in terms of human and financial resources. Not all traditional villages have strong institutional structures or adequate budgets to systematically manage waste. Some villages still rely on manual mutual cooperation without technological or infrastructure support, making it difficult to match the increasing rate of waste generation.

Fourth, although pararem is socially effective, its implementation is often fragmentary because each village has different rules. There is no standard mechanism that connects intervillage pararem with local government regulations, so cross-regional coordination is sometimes less than optimal.

Thus, while traditional villages and local wisdom make a significant contribution to waste management in Bali, their sustainability depends on the ability to address modernization challenges, integration with the tourism sector, and institutional capacity building. Collaboration between traditional villages, governments, and modern communities is key to ensuring that the values of local wisdom remain relevant in facing the dynamics of contemporary waste management.

4. Public Policy Analysis

Waste management in Bali takes place within a formal regulatory framework that forms a multilevel legal system ranging from national, provincial, to district/city policies. However, the uniqueness of Bali lies in its ability to integrate these formal policies with sociocultural practices that are sourced from local wisdom and customary institutions. This integration makes waste management in Bali not only administrative, but also has strong social and spiritual legitimacy.

Nationally, the main legal framework is Law No. 18 of 2008 on Waste Management, which emphasizes a new paradigm of waste management from "collect, transport, dispose of" to 3R (Reduce, Reuse, Recycle) based on reduction and handling. This law affirms the responsibility of the central government, local governments, the business world, and the community in realizing sustainable waste management. In the context of Bali, this regulation is a foothold to formulate derivative rules that are more contextual with regional conditions.

At the provincial level, Bali issued Regional Regulation No. 5 of 2011 on Waste Management, which substantively regulates the role of local governments, communities, and business actors in reducing and managing waste. This Regional Regulation is one of the initial efforts of the Bali Provincial Government to adapt the mandate of Law No. 18 of 2008 to local needs. The implementation of this regional regulation was then strengthened through Bali Governor Regulation No. 47 of 2019 on Source-Based Waste Management, which is an important milestone in efforts to reduce single-use plastic waste. This Governor's Regulation prohibits the use of plastic bags, styrofoam, and single-use plastic

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

straws in shopping centers, modern markets, and restaurants. Although formal policies such as Bali Governor's Regulation No. 47 of 2019 already exist, their implementation is still hampered by a lack of supervision on the ground, which results in many violations in the tourism sector.

At the district or city level, a number of regions in Bali have also formulated specific policies to strengthen provincial regulations. For example, Denpasar City Regional Regulation No. 8 of 2023 on Waste Management, which places a stronger emphasis on waste sorting from sources, TPS3R-based management, and the application of administrative sanctions for violators. This regional regulation reflects the seriousness of the city government in overcoming the increasingly complex urban waste problem, especially with the limited capacity of the Suwung landfill.

This policy analysis shows that there are efforts to synchronize between central and local policies, although there are still some gaps. Law No. 18 of 2008 has provided a fairly comprehensive general framework, but its implementation requires adaptation to local Balinese wisdom, such as the concept of Tri Hita Karana, customary village awigs, and the practice of mutual cooperation (ngayah). This integration makes public policy in Bali more contextual than simply copying the national model.

However, this synchronization doesn't always go smoothly. First, there is the challenge of harmonizing regulations between formal rules and customary norms. For example, although customary village pararem strictly prohibits the indiscriminate disposal of waste, not all formal rules provide flexibility for customary villages to impose customary lawbased sanctions. Second, limited institutional capacity at the local level, both in terms of funding and human resources, often hinders the effectiveness of the implementation of regional regulations or governor's regulations. Third, inconsistent law enforcement is still a problem, because in some areas business actors and the community continue to use single-use plastics even though they have been banned.

On the other hand, increasingly stringent formal regulations also have a positive impact on local innovation. Governor's Regulation No. 47 of 2019, for example, encourages the birth of various community initiatives, such as the Bring Your Own Bag movement, refill stations, and zero plastic campaigns in tourism areas. Meanwhile, Denpasar City Regulation No. 8 of 2023 strengthens waste sorting programs at the banjar and school levels, which is then synergized with traditional practices such as modern teba and traditional village waste banks.

Thus, public policy analysis shows that formal regulation and local practice in Bali operate in a complementary relationship: regulation gives legal legitimacy, while customary villages and local wisdom give social legitimacy. The success of waste management in Bali in the future is largely determined by the extent to which the harmonization of the two can be strengthened, so that public policy does not just stop as a normative document, but really lives in the daily practices of society.

5. Implementation Challenges and Barriers

Although Bali already has a relatively complete regulatory framework, from the national level to customary villages, the implementation of waste management policies still faces various structural and cultural challenges. This challenge arises because waste management is not only a technical issue, but also involves changes in behavior, institutional capacity, and economic interests that are often not in line with the principles of sustainability.

First, the lack of public awareness is still the dominant factor that hinders the effectiveness of policies. Although various regional regulations and governor's regulations have mandated the sorting

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

of waste from sources, many people are still used to throwing waste in a mixed way. For example, the DLHK Bali report (2022) shows that although sorting facilities are available in some traditional Denpasar markets, most traders still mix organic and inorganic waste for practical reasons. This suggests that behavior change requires a long process, even though formal rules are already in place.

Second, there are limitations in waste processing infrastructure. According to Abdulai et al., (2024), infrastructure is defined as the physical assets and supporting systems used to collect, transport, and dispose of waste, making it essential in facilitating sustainable waste collection and disposal. One of the most obvious cases is the Suwung Landfill in Denpasar which accommodates waste from Denpasar City, Badung, Gianyar, and Tabanan Regencies. With limited capacity, this landfill often experiences a buildup of garbage that causes a strong odor that local residents complain about. In 2023, the overcapacity condition of the Suwung Landfill triggered protests from the people of Pesanggaran, because the waste generation reached more than 1,200 tons per day, far exceeding its ideal capacity. This condition shows that without serious investment in treatment infrastructure, waste sorting and reduction policies only stop at the level of discourse.

Third, the conflict of interest between tourism and sustainability is a significant challenge. The tourism industry as the main driver of Bali's economy contributes to the generation of large amounts of waste, especially single-use plastics. Although Bali Governor Regulation No. 47 of 2019 has banned the use of single-use plastics, its implementation is still weak in the field. Examples can be found in the tourist areas of Ubud and Kuta, where a number of hotels and restaurants still use plastic because it is considered more efficient for fast service. WALHI Bali Report (2023) noted that the tourism sector's compliance with environmental regulations is still low, especially for small and medium-sized businesses. This presents a dilemma: on the one hand, tourism demands practical service standards, while on the other hand, regulations require environmentally friendly practices.

Fourth, limited funding for customary villages is also an obstacle. Customary villages have the social legitimacy to enforce awig-awig or pararem-based rules, but are often limited in terms of budgets. For example, in Pererenan Traditional Village, Badung, a pararem prohibiting the dumping of garbage into the river is already in effect, but the supervision is still weak because there is no special fund to provide field officers or waste transportation facilities. As a result, violations are still found, especially from tourists or tourism business actors who are not directly tied to the traditional village pararem. This case shows that the success of indigenous villages in supporting formal policies is highly dependent on sustained funding support.

In addition, there are other obstacles in the form of inconsistencies in law enforcement. For example, although the ban on single-use plastics is formally enforced, supervision in traditional markets is still lax. In Badung Market, Denpasar, there are still many traders who give single-use plastic bags to consumers because there are no strict sanctions given. This lack of seriousness in law enforcement makes some people think that policies are only a formality.

Thus, it can be concluded that the challenges of implementing waste management policies in Bali are not only technical, but also social, economic, and institutional. Lack of public awareness, limited infrastructure, conflicts of tourism interests, and limited funding for indigenous villages are the main inhibiting factors that must be overcome. Examples of cases such as the Suwung landfill crisis, non-compliance of the tourism sector in Ubud and Kuta, and weak enforcement of pararem in

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

Pererenan Traditional Village illustrate that these challenges are real in the field. If these obstacles are not immediately addressed, then waste management policies risk not achieving the expected sustainability goals.

Source: Tribun-bali.com, 2025

6. Best Practices & Success Case Studies

Although waste management in Bali faces various challenges, there are a number of best practices that can be used as a model for replication in other areas. This case study shows that a combination of regulation, community participation, technological innovation, and local wisdom is able to create more effective and sustainable waste management.

One of the applications of local wisdom in waste management is in Penglipuran Traditional Village. Penglipuran Traditional Village in Bangli is widely known as an environment-based tourism village with a zero waste concept. The local community has a high awareness of maintaining environmental cleanliness, which is supported by strict customary rules (awig-awig) regarding the prohibition of littering. Waste management is carried out by a sorting system starting from the household, where organic waste is processed into compost, while inorganic waste is recycled or sent to a waste bank. Penglipuran Village also takes advantage of the tourism moment to educate tourists, so that sustainability practices become part of the tourism experience. This success makes Penglipuran one of the most prominent examples of the synergy between green tourism, local wisdom, and environmental policies.

Another example comes from the Pererenan Traditional Village in Badung, which implements pararem (customary rules) related to waste management. This regulation prohibits residents from throwing garbage into rivers and open land, with customary sanctions in the form of fines or obligations of ngayah (social work). This customary-based approach is effective because the community respects customary village rules more than formal government regulations. Culture-based policy studies show that the social legitimacy of indigenous villages can strengthen the implementation of public policies, especially in environmental issues. However, challenges remain, such as budget limitations and the involvement of tourists who have not fully complied with the pararem.

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

In addition, Cemenggaon Village in Gianyar Regency is also an example of good practices in community-based waste management. This village has succeeded in developing TPS3R (Reduce, Reuse, Recycle Waste Processing Place) which is managed independently by the customary village with the support of the local government. This system allows household waste to be sorted from the beginning, then further processed at TPS3R to be processed into compost, recycled crafts, and industrial recycled materials. Interestingly, community participation in Cemenggaon Village is relatively high because it is strengthened by the awigawig of the traditional village which requires each household to sort waste before it is handed over to the transport officer.

The strength of the Cemenggaon model lies in the synergy between the customary awig-awig and the technical support of the local government, so that waste management is not only based on moral awareness, but also has real incentives and consequences. As a result, the rate of waste sorting in Cemenggaon is relatively higher than other villages in Klungkung. In addition, this village also uses the yard of the house for modern teba, so that organic waste can be processed into compost or animal feed, while plastic waste is sold through a waste bank to increase residents' income.

The city of Denpasar is also one of the successful examples of community-based waste management innovation through the waste bank program. This concept allows people to save inorganic waste, such as plastic or paper bottles, which then have economic value. Waste banks not only help reduce waste entering landfills, but also create economic impact through increasing people's income. This program has even been supported by the city government through formal policies and waste bank management training. Bappenas Study (2022) shows that waste banks in Denpasar make a real contribution to improving the local circular economy, as well as fostering public awareness of the value of waste as a resource.

Another good practice is the emergence of multi-stakeholder synergies in waste governance. For example, cooperation between local governments and the private sector in supporting TPS3R or recycling facilities, as well as collaboration with environmental communities with hotels and restaurants to reduce single-use plastic waste. One of the initiatives that has been quite successful is the "Clean Bali" program involving DLHK Bali, the environmentalist community, and tourism business actors. This collaboration shows that sustainable solutions are only possible when all actors are actively involved and share responsibility.

From the various case studies above, it can be seen that the success of waste management in Bali is determined by a combination of three main factors: (1) social legitimacy through customary rules, (2) institutional and technological innovations such as waste banks and TPS3R, and (3) multi-stakeholder synergies between the government, community, and the private sector. These good practices show that although structural challenges still exist, Bali has strong social and institutional capital to develop sustainable waste management models based on local wisdom.

7. Policy Implications & Model Recommendations

The experience of waste management in Bali shows that structural challenges such as limited infrastructure, lack of public awareness, and tourism pressures can be overcome through a combination of formal regulations and local wisdom. Therefore, the policy implication that emerges is the need to build a sustainable governance model based on local wisdom, which is able to unite various actors, values, and policy instruments in one framework.

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

First, the integration of formal regulations with local wisdom is the main pillar. National regulations such as Law No. 18 of 2008 on Waste Management and its derivatives at the provincial and district/city levels need to be translated contextually through awig-awig and customary village pararem. With this approach, government regulations not only have legal legitimacy, but also stronger social legitimacy in the eyes of the Balinese people. The success of environmental policies in Bali depends heavily on the harmonization between formal rules and customary norms (Hajar, 2025).

Second, the empowerment of indigenous villages as the main actors in environmental governance needs to be strengthened. Customary villages have social authority, established institutions, and direct proximity to the community. This makes customary villages the front line in enforcing waste management rules. The government can provide support in the form of environmental incentive funds, technical training on waste management, and infrastructure facilitation such as TPS3R and waste banks. This approach is in line with the concept of community-based governance which places local communities as the main agents of change in resource management.

Third, multi-stakeholder collaboration is a requirement for sustainability. The government cannot work alone in addressing the waste problem, but needs to build networks with indigenous villages, environmental NGOs, communities, and the private sector. For example, cooperation between the tourism industry and indigenous villages in reducing the use of single-use plastics or supporting local recycling programs. The concept of collaborative governance according to Ansell & Gash, 2008 (in Muhammad Noor et al., 2022) emphasizing that successful management of complex issues such as waste requires trust, ongoing dialogue, and responsibility-sharing mechanisms between actors.

Fourth, it is important to build a sustainable public governance framework for the Bali environment. This governance is not only oriented to waste management as a technical issue, but also related to social, cultural, and economic sustainability. The Tri Hita Karana principle can be used as a philosophical foundation in building a sustainable governance model, which is to maintain the harmony of human relations with God, fellow humans, and the environment. Thus, waste management in Bali not only meets administrative standards, but also reflects a cultural identity that is in harmony with nature.

The policy recommendation model can be described as an integrative framework: (1) formal regulation provides a legal umbrella and resource support, (2) customary villages become the social motor in law enforcement and participation mobilization, (3) communities and NGOs play a role in education and innovation, and (4) the private/tourism sector becomes a partner in financing and implementation. The combination of these four elements allows for the birth of adaptive, participatory, and sustainable waste management.

The policy implication of this model is that waste management is no longer seen solely as a technical affair of DLHK, but as a cross-sectoral agenda that demands cultural, legal, and economic synergy. If successfully implemented consistently, Bali has the potential to become a role model for sustainable environmental governance based on local wisdom at the national and even global levels

CONCLUSION

The results highlight that effective waste governance in Bali depends on the interaction between formal regulation, cultural legitimacy, and technological adaptation. Integrating these aspects

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

encourages long-term public participation and ensures that environmental policies are not only legally binding but also socially meaningful.

This study shows that waste management in Bali faces major challenges in the form of limited infrastructure, low public awareness, and pressure from the tourism sector. However, the integration of formal regulations such as Law No. 18 of 2008, Bali Governor's Regulation No. 47 of 2019, and Denpasar Regional Regulation No. 8 of 2023 with local values such as Tri Hita Karana, awig-awig, and customary village pararem has proven to be an effective strategy to strengthen policy implementation. With this approach, waste management in Bali is not only oriented towards legal compliance, but also builds social legitimacy through local culture.

This research affirms the concept of sustainable public governance based on local wisdom, with customary villages as the main actors of environmental governance. The novelty of this study lies in the emphasis on synergy between customary norms and public regulations as a collaborative system that strengthens each other. In practical terms, these findings recommend increased funding support, incentives for the environmentally friendly tourism sector, and culture-based environmental education for the younger generation.

In the future, further research is suggested to quantitatively test the extent to which the application of environmental parameters affects the level of community compliance with waste sorting and reduction (compliance rate). This approach will strengthen the validity of the proposed governance model and open up space for similar implementation in other areas with strong local cultural character.

REFERENCES

Abdulai, I. A., Fuseini, M. N., & File, D. J. M. B. (2024). Making cities clean with collaborative governance of solid waste infrastructure in Ghana. *Cleaner Waste Systems*, *8*(May), 100150. https://doi.org/10.1016/j.clwas.2024.100150

Asmal, I., Walenna, M. A., Nas, W., & Ridwan. (2023). Application of local wisdom in handling waste in coastal settlements as an effort to minimize waste production. *Environmental and Sustainability Indicators*, *19*(January), 100283. https://doi.org/10.1016/j.indic.2023.100283

Bali, P. P. (2019). Bali Governor Regulation No. 47 of 2019 concerning Source-Based Waste Management. In *Bali Provincial Government*. https://dklh.baliprov.go.id/wpcontent/uploads/2020/07/23.-Pergub-47-TH-2019-compressed.pdf

Bappenas. (2022). The Future is Circular: Real Steps for Circular Economy Initiatives in Indonesia. In *Bappenas*.

Dang, T. T. D., & Dang, T. H. A. (2025). Effect of tourism on waste discharge and treatment in Vietnam's Red River Delta. *Cleaner Waste Systems*, *11*(January). https://doi.org/10.1016/j.clwas.2025.100311

Geria, I. M., Nastiti, T. S., Handini, R., Sujarwo, W., Dwijendra, A., Fauzi, M. R., & Juliawati, N. P. E. (2023). Built environment from the ancient Bali: The Balinese heritage for sustainable water management. *Heliyon*, *9*(11), e21248. https://doi.org/10.1016/j.heliyon.2023.e21248

Ghopar, Abdul; Kurniawan, A. et. A. (2023). *Environmental Review 2023*.

ISSN Print: 2686-6242, ISSN Online: 2686-6250
https://doi.org/10.30589/proceedings.2025.1332

Hajar, I. (2025). Plastic Waste Emergency: Community Resistance to Plastic Waste Management Policies in Denpasar City. Journal of Research of the Art, Design and Media Group, *4* (April). https://prin.or.id/index.php/JURRSENDEM/article/view/5984%0Ahttps://prin.or.id/index.p/URRSENDEM/article/download/5984/4445

Jaipakdee, P., Vibhatabandhu, P., Vitayavarawat, P., & Supakata, N. (2025). Waste composition and engagement in management initiatives: A study at Chulalongkorn University across academic periods. *Green Technologies and Sustainability*, *July*, 100252. https://doi.org/10.1016/j.grets.2025.100252

Ministry of Environment and Forestry (MoEF). (2024). *National Waste Management Information System (SIPSN).* https://sipsn.kemenlh.go.id/sipsn/public/data/timbulan Governor's Regulation Number 97 of 2018 concerning Restrictions on the Generation of Single-Use Plastic Waste.

Lohani, A., Bista, B., Mahato, A. B., Khanal, A. J., Dulal, B., Tripathee, B. R., Karki, K., Gurung, S. B., Kafle, S., & Karki, B. K. (2025). Seasonal variation in solid waste composition and characteristics in a newly formed semi-urban municipality of Nepal. *Cleaner Waste Systems*, *10*(February), 100228. https://doi.org/10.1016/j.clwas.2025.100228

Muhammad Noor, S.Sos., M. A. P., Dr. Falih Suaedi, Drs., M. S., & Dr. Antun Mardiyanta, Drs., M. S. (2022). *COLLABORATIVE GOVERNANCE* (Vol. 17).

Rahman, F. (2024). Societal impact of recycling waste into composite materials. *Societal Impacts*, *4*(August), 100082. https://doi.org/10.1016/j.socimp.2024.100082

Rahmatulloh, A., Darmawan, I., Aldya, A. P., & Nursuwars, F. M. S. (2025). WasteInNet: Deep Learning Model for Real time Identification of Various Types of Waste. *Cleaner Waste Systems*, *10*(December 2024), 100198. https://doi.org/10.1016/j.clwas.2024.100198 Law Number 18 of 2008 concerning Waste Management

You, Y., Chew, B. C., & Fan, H. (2024). Collaborative Governance Empowered by Digital Technology - Construction of Precision Intelligent Control and Early Warning Platform for Construction Solid Waste. *Proceedings of Computer Science*, *247*(C), 718–726. https://doi.org/10.1016/j.procs.2024.10.087