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Assessment of Waste Management Governance Capacity Based on TPS 3R in Buleleng Regency, Bali

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Abstract

Waste management in Buleleng Regency, particularly in Panji Anom Village, still faces various challenges despite efforts from the government through Bali Governor Regulation No. 47 of 2019. This study aims to analyze the governance capacity of waste management, focusing on the implementation of the Integrated household waste management based on Reduce, Reuse, and Recycle (TPS 3R) site system. The method used is a qualitative phenomenological approach through semi-structured interviews with stakeholders, along with analysis using the Governance Capacity Framework (GCF). The results show that although there is political support and community involvement, challenges such as service accessibility, limited infrastructure, and a lack of financial resources remain major obstacles. Factors facilitating the implementation of TPS 3R include active stakeholder engagement and a continuous learning process. However, low community participation and budget constraints hinder the effectiveness of the program. Strategic recommendations to improve governance capacity include expanding service accessibility, enhancing information transparency, diversifying financial resources, and strengthening local capacity. With these measures, it is hoped that the implementation of TPS 3R can be more effective and sustainable, supporting the development of better waste management policies in Buleleng Regency.

Keywords: waste management, governance capacity, TPS 3R, Panji Anom Village

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1. Introduction

One of the focuses of the Bali Provincial Government in implementing environmental sector programs is waste management. To that end, the Bali Provincial Government has issued Bali Governor Regulation Number 47 of 2019 concerning Source-Based Waste Management. This Governor Regulation aims to realize a clean culture; improve environmental quality; improve public health; make waste economically valuable; and increase the role of Generators, Traditional Villages, and Villages/Sub-districts in waste management. However, its implementation has not been optimal (Mahadewi dkk., 2023) including in Buleleng Regency. In Buleleng Regent Regulation No. 1 of 2019 concerning Jakstrada, the Buleleng Regency Government has estimated 171,199.37 tons of waste generation, set 51,359.81 reduction targets, and handled 119,839.56 tons.

To achieve this target, several efforts have been made by the Buleleng Regency Government, such as from the policy aspect, increasing community participation through traditional villages and/or service villages, and providing infrastructure. From a policy aspect, for example, the government has issued Buleleng Regent Instruction Number 367/DLH/2019 concerning the use of single-use plastics by referring to Bali Governor Regulation Number 98 of 2018 concerning the Limitation of Single-Use Plastic Waste Generation. In addition, Buleleng Regent Regulation Number 1 of 2019 concerning Buleleng Regency Policies and Strategies in the Management of Household Waste and Household-Similar Waste has also been stipulated. One of the strategies in the attachment to this regulation is strengthening community involvement through communication, information, and education (KIE). One of the programs to realize this is community-based waste management through socialization and guidance of Environmentally Aware Villages by: 1) including environmental/waste management in the awig-awig/pararem, 2) requiring villages to carry out independent waste management, 3) building TPST 3R facilities and Waste Banks. Specifically, for TPS 3R facilities, currently only 27 are available. On the other hand, Buleleng Regency is the largest area in Bali Province (136,588 Ha) which is administratively divided into 9 Districts with 129 Villages, 19 Sub-districts, and 550 Hamlets/Hamlets and 58 Environments. The

availability of 3R TPS is far from adequate.

Based on a report from the Buleleng Regency Environmental Service, in July 2020 the average daily waste entering the TPA reached 437 m^3 consisting of 354 m^3 of urban waste and 83 m^3 of rural waste. The amount of waste entering the TPA has caused the height of the waste pile to reach 15 meters from the ground surface. Therefore, the local government has prepared 27 3R TPS. However, not all villages have been reached. One of the villages in Buleleng Regency that does not yet have a 3R TPS is Panji Anom Village. The Panji Anom Village Government plans to create a 3R waste management site (TPS 3R). The creation of TPS 3R is urgently needed to handle and reduce waste in the Panji Anom Village environment that is transported to the TPA. TPS 3R Panji Anom Village is planned to serve 1955 families, which currently has a population of 6870 people.]

Referring to the TPS 3R Technical Instructions (DJCK, 2017), TPS 3R is a place where collection, sorting, reusing, recycling, and processing activities are carried out on a regional scale. This is to reduce the quantity and/or improve the characteristics of waste, which will be further processed at the TPA. However, most TPS 3R do not operate optimally (Wati et al., 2021; Budha et al., 2023). According to (Mahadewi et la., 2023), the inhibiting factors are: First, Inadequate budget, especially from the APBD. Provision of facilities and infrastructure in waste management, especially TPST 3R which must sort organic and inorganic waste, requires a considerable budget. Second, there is no technical guidance for the community in waste management. The socialization of related agencies regarding the responsibility of waste management is not accompanied by training or technical guidance, so that community participation stops at awareness of waste management but does not continue to how to manage it technically. Third, Community participation and awareness of the importance of waste management are low. Various socializations and assistance that have been carried out also do not have much impact on community participation. Five weaknesses in the management of the TPST Kesiman Kertalangu Village, Denpasar, Bali have also been identified by (Budha et al., 2027). The five are 1) The documents for waste management plans and strategies including institutions and regulations are not yet optimal, 2) The limited TPST facilities that are only provided, 3) The lack of a waste planning system including a waste database, 4) The decreasing capacity of the TPA, and 5) The ability of the machine to manage waste that has not reached its proper capacity, causing a smell. According to (Zafira & Damahuri, 2019), the main parameter that most influences the non-functioning of TPS 3R is the potential for program sustainability.

The problem is how to prepare a sustainable 3R TPS. Based on these problems, a relevant problem-solving approach to determine the potential factors that facilitate or hinder waste management governance by implementing 3R TPS is to apply the Governance Capacity Framework (GCF) diagnostic approach. The Governance Capacity Framework (GCF) is an empirically based diagnostic approach to assess factors that facilitate or hinder environmental governance in urban areas (Dbiba et al., 2020; Aguilar et al., 2022; Dang et al., 2015). According to (Koop et al., 2017), there are three concepts of governance capacity. First, governance capacity includes the ability of actors to jointly identify and act in facing collective challenges. Second, governance capacity is shaped by the interaction of actors influenced by socio-institutional conditions and resource distribution. Third, governance capacity refers to the values, culture, and interests of actors that shape their interactions and influence collective problem solving. GCF is indeed more tested at the city level. CGF was chosen for this study for several reasons. The most important reason is that GCF integrates a large amount of governance literature (Koop et al., 2017). In addition, GCF can be used as an evaluation method for any type of challenge that requires multi-organizational networks to work together to find common solutions (Koop et al., 2017). This study aims to assess governance in TPS3R-based waste management in Buleleng Regency by adopting and adapting the GCF diagnostic.

2. Method

The research method used was a survey with a qualitative phenomenological approach, in which semi-structured interviews were conducted to gather information from informants regarding governance capacity in TPS 3R-based waste management. In this study, GCF is applied to assess the capacity to implement TPS 3R in a context involving various stakeholders. The application of GCF by adapting the concept of governance capacity developed by (Koop et al., 2017). This framework consists of 27 indicators covering nine conditions and three dimensions (Table 1). The “knowing” dimension addresses the need to be aware of, understand and learn about the risks and impacts of environmental challenges, policies and strategic choices. The “willing” dimension tests the willingness of stakeholders to work together, state and act on their ambitions and commit to using their capabilities to find solutions. The “enabling” dimension considers the networks, resources and instruments that stakeholders must realize their ambitions (Koop et al., 2017).

The research process was carried out through literature review, interviews with stakeholders, and feedback collection from informants. This study involved several key informants, including Gusti Putu Armada (57 years old) as the Village Head, I Nyoman Artana (54 years old) as a village-owned business entity (BUMDes) employee, I Ketut Cantyana (55 years old) as a civil servant, and Prof. Astra (62 years old). Additionally, materials used in this research include policy documents related to waste management, scientific literature, and relevant secondary data to support the analysis. Tools such as voice recordings and field notes were also used to strengthen the data collection process. Data were analyzed by reducing, presenting, and drawing conclusions from the information obtained, while maintaining data validity through the principles of credibility, transferability, dependability, and confirmability.

Table 1. GCF dimensions, conditions and indicators

Dimensions	Conditions	Indicators
Kowledge	1. Awareness	1.1 Community knowledge 1.2 Local sense of urgency 1.3 Internalization of behavior
	2. Useful knowledge	2.1 Availability of information 2.2 Transparency of information 2.3 Cohesion of knowledge
	3. Continuous learning	3.1 Intelligent monitoring 3.2 Evaluation 3.3 Learning across stakeholders
Desire	4. Stakeholder engagement process	4.1 Stakeholder inclusiveness 4.2 Protection of core values 4.3 Progress and diversity of choices
	5. Management ambition	5.1 Ambitious and realistic management 5.2 Discourse embedding 5.3 Policy cohesion
	6. Change agents	6.1 Entrepreneurial agents 6.2 Collaborative agents 6.3 Visionary agents
Supporters	7. Multi-level networks potential	7.1 Room for maneuver 7.2 Clear division of responsibilities 7.3 Authority
	8. Financial feasibility	8.1 Affordability 8.2 Consumer willingness to pay 8.3 Financial sustainability
	9. Implementation capacity	9.1. Policy instruments 9.2. Legal compliance 9.3 Preparedness

3. Results and Discussion

3.1 Awareness

The level of knowledge and awareness of the people of Buleleng Regency regarding waste management, particularly about the reduction, reuse, recycling (3R) waste processing site, is still relatively low. Although there have been advancements in waste management, such as the establishment of waste banks and educational programs, public awareness of waste sorting and reduction needs to be improved to meet the waste reduction targets as stipulated in Governor Regulation No. 47 of 2019. Research by Perdana (2021) indicates that active participation from both the community and the government in communal waste management is crucial, despite the ongoing challenges in governance and knowledge limitations. Rachman (2024) emphasizes that a good understanding of the 3R concept can enhance community participation in maintaining environmental cleanliness.

Community awareness in Buleleng Regency regarding waste management is reflected in survey results showing that most respondents agree on the importance of 3R-based waste management. Nevertheless, challenges persist, particularly concerning weak regulation enforcement. Widianto (2024) stresses the urgency of waste management given the continually increasing waste volume. Although regulations such as the ban on burning waste have been established, weak law enforcement remains an obstacle to effective implementation. Supriyanto et al. (2021) add that a firmer and more systematic approach is needed to improve community discipline in adhering to waste management regulations.

Behavioral changes among the community concerning waste management are also a significant issue, as

population growth results in large volumes of waste generated daily. While there have been positive changes in community behavior, many government programs focus only on initial implementation without ensuring long-term impacts. Sumarno (2017) reveals that communities that are not fully aware often have their own assessments regarding waste management. However, as awareness increases, people are beginning to shift from conventional management practices to more effective and efficient systems through the 3R approach (Reduce, Reuse, Recycle), as expressed by Darojat (2020). With sustained support and proper monitoring, it is hoped that the community can contribute more actively to creating a clean and sustainable environment.

3.2. Beneficial Knowledge

The availability of information regarding resource-oriented waste management systems based on the 3R (Reduce, Reuse, Recycle) approach in Buleleng Regency has shown significant progress, although there are still knowledge gaps that are difficult to identify. While the quantity of information has increased, understanding the causes, risks, and long-term impacts of waste management still lags. An informant emphasized the importance of transparency in waste management and how the 3R sites can support the development of waste banks in villages. With interconnected information, the community can better understand the economic potential of well-managed waste. Setianing (2023) states that although information is available through various platforms, the challenge lies in how it is conveyed, which must be tailored to be understandable to the public, especially those in remote areas.

Transparency of information in waste management is crucial for creating an effective system. Survey results show a variation of views among respondents regarding information transparency, with some perceiving positive value while others express dissatisfaction. Although efforts have been made to establish waste banks and enhance the economic value of waste, community participation in waste management remains a barrier. Informants revealed that training provided to groups of housewives to process waste into valuable items demonstrates existing potential, but the main challenge remains the sustainability of the program. Firmansyah (2023) adds that increasing public awareness of the importance of cleanliness can change behavior in daily waste management, creating a better ecosystem for sustainable management.

Cohesion in conveying information about 3R-based waste management is essential to ensure comprehensive understanding among various stakeholders. This facilitates the exchange and integration of data across different policy areas, such as environment and health. Despite differing opinions among respondents regarding waste management, the importance of considering geographical aspects in the placement of 3R sites cannot be overlooked. Community awareness of the importance of waste management is increasing, as seen from the changes in the location of the 3R site in Banyuning Market. However, potential conflicts between waste management and community comfort need to be addressed by involving them in decision-making. With an approach that considers these various aspects, effective waste management is expected to improve the quality of life for the community and preserve environmental sustainability (Alfianto et al., 2024).

3.3. Continuous Learning

Continuous learning in waste management in Buleleng Regency through the 3R (Reduce, Reuse, Recycle) system has shown progress, especially in monitoring resource-oriented waste management. This monitoring aims to recognize concerning situations and identify underlying trends. Survey results reveal a variation in scores from respondents, with some rating this monitoring system as very good, while others feel there is still room for improvement, particularly regarding responsiveness and accuracy. An expert emphasizes the importance of supporting waste utilization to achieve sustainable waste management, as well as the need for clarity in organizational structure and funding. An example from the Segare Ning group in North Banyuning demonstrates how plastic waste can be processed into valuable products, highlighting the economic potential that exists when management is conducted properly. Research by Rahman (2024) also highlights that an integrated approach involving all elements of society, including individuals and institutions, is crucial for addressing the complexities of plastic waste issues.

Evaluations of the 3R waste management policy in Buleleng Regency indicate that while there are some positive aspects, many challenges still need to be addressed. Survey results suggest that many respondents feel that the evaluations currently conducted are superficial and merely formalities. Effective evaluations must be supported by clear indicators to provide a comprehensive picture of the waste management situation. Research by Putri et al., (2023) emphasizes the importance of policy evaluation in measuring program effectiveness, which not only contributes to reducing waste entering landfills (TPA) but also increases community awareness of the importance of waste sorting and management. Empowering communities and groups in waste management also needs to be enhanced to achieve the desired outcomes. This policy evaluation plays a crucial role in creating economic benefits from recycling, as well as ensuring accountability and transparency in resource use.

Cross-stakeholder learning in Buleleng Regency shows that collaboration between the government, the community, and the private sector is vital for resource-oriented waste management. Although most respondents feel that collaboration is going well, challenges remain in communication and decision-making involving the community. Research by Noor et al. (2023) indicates that active community participation in reduce, reuse, recycle (3R) activities can help reduce waste and enhance environmental awareness. One informant noted that waste management in other areas, such as Yogyakarta, can provide higher economic value through good synergy among all parties. To achieve similar success, proactive awareness and action in waste sorting are required, along with the involvement of all stakeholders to create a more sustainable and productive management system. This synergy is expected to positively contribute to the environment and improve the quality of life for the community

3.4. Stakeholder Engagement Process

The involvement of all stakeholders in resource-oriented waste management is crucial for creating inclusive and effective solutions. Assessment results from four respondents show a variety of perspectives: two respondents gave positive scores, one respondent gave a neutral score, and one respondent gave a negative score. Respondents with positive scores felt that the engagement process was sufficiently open and transparent, while respondents with neutral and negative scores reflected concerns related to transparency and difficulties in conveying their views. Therefore, it is important to enhance engagement mechanisms to ensure that all voices are heard and to provide clear guidelines for waste management groups to compete with scavengers.

The management of 3R waste management in Buleleng Regency shows significant differences in organizational structure and responsibilities among management groups. In waste banks, the presence of a Decree from the village head provides clear legitimacy, while in 3R sites, management is often conducted based on individual desires without a structured guideline. Community awareness also plays a vital role, as residents often prefer to dispose of waste in temporary collection points, reducing the supply of raw materials for 3R sites. Therefore, the involvement of all stakeholders, including the government and the community, is essential for creating sustainable waste management.

The prospect of benefits for stakeholders in waste management is also an important aspect to encourage participation. Assessment results indicate that two respondents are confident about the significant benefits of their involvement, while two others feel neutral. To enhance participation, it is important for decision-makers to provide clear information regarding potential benefits. Stakeholders have recognized that waste management not only addresses pollution problems but can also serve as a profitable economic source, such as increasing the market value of sorted and processed waste. With the right approach, waste management can provide significant economic value and environmental benefits.

3.5. Management Ambitions

Assessment of the goals of the 3R-based waste management system shows varying perspectives among stakeholders. Of the four respondents, two gave positive scores, one neutral, and one negative. Respondents with positive views believe the goals are ambitious yet realistic, supported by measurable intermediate targets, while neutral and negative respondents expressed uncertainty and skepticism about the system's ability to achieve those goals. Therefore, it is important to establish a clear action plan and involve all stakeholders in the planning process to ensure successful waste management.

Waste management through 3R systems in Buleleng faces challenges and opportunities related to the local historical, cultural, and political context. Positive-scoring respondents believe that waste management ambitions align with local values and are supported by pro-environment policies. However, neutral and negative respondent’s express concerns that political factors and existing norms may hinder the system's effectiveness. Hence, it is crucial to involve the community at every stage of planning and implementation so that waste management can be well-integrated into the local context.

Policy coherence for the 3R-based waste management system is essential for creating an effective system. Assessment results indicate varying views on the relevance and coherence of policies across different geographical and administrative boundaries. Positive respondents believe existing policies align with resource management principles, while negative respondents worry that these policies are not sufficiently relevant to address waste management needs. To enhance policy relevance and coherence, all stakeholders need to be involved in the policy formulation process, considering local contexts and geographical factors so that waste management can operate effectively and sustainably.

3.6. Change Agents

Entrepreneurial agents play a crucial role as change agents in resource-oriented waste management. Assessment from four respondents shows a variation of views regarding entrepreneurs' ability to utilize existing resources and opportunities. Two respondents gave positive scores, stating that entrepreneurs can significantly contribute to improving the efficiency of the 3R system, while neutral respondents felt that their access and influence in decision-making are not yet optimal. To enhance their role, a supportive ecosystem is needed, including better access to resources and opportunities to participate in decision-making.

Collaboration among stakeholders, including the government, communities, and entrepreneurs, is also vital for implementing the waste management system in Buleleng Regency. The assessment indicates that although there is good collaboration, challenges remain in connecting various parties. Positive respondents see the potential for synergy, while neutral respondents note a lack of coordination. To improve engagement, all parties need to establish good communication and create effective interaction platforms so that waste management can be applied more sustainably.

Visionary actors play a key role in formulating and implementing integrated strategies for resource-oriented waste management. The assessment shows a positive view of their efforts, despite the challenges in implementation that still exist. To strengthen their role, capacity building and participation from all stakeholders in decision-making are necessary. The success of this strategy depends on a commitment to sustainability and environmental conservation, as well as adequate knowledge to create innovative solutions in waste management. Thus, collaboration among communities, government, and entrepreneurs can realize an effective and sustainable waste management system.

3.7. Multilevel Network Potential

Waste management actors through the 3R system in Buleleng Regency have good freedom and opportunities to develop innovative approaches and partnerships that support resource-oriented waste management systems. Assessments from four respondents show an optimistic outlook, with all giving positive scores regarding the space for innovation and collaboration. However, challenges in coordination and the implementation of innovative ideas still exist, making it important to continuously support initiatives that encourage creativity and collaboration among all stakeholders.

The division of responsibilities in managing the 3R system shows varying perspectives among respondents, with two giving high positive scores and the other two providing neutral or negative scores. Positive respondents assess that the allocation of responsibilities is clear, enhancing efficiency, while neutral respondents feel uncertain about the clarification of responsibilities. To improve effectiveness, it is essential to ensure that responsibilities are clearly defined, supported by training and good communication among stakeholders, as well as support from the government.

The level of power and authority presence in waste management also varies, with two respondents giving positive scores and two neutral. Positive respondents see government support creating an effective framework, while neutral respondents note challenges in implementation. Strengthening institutional structures and clear regulations regarding the types of waste that can be processed in the 3R system is crucial to ensure safe and sustainable management. With an integrated approach and strong support, waste management in Buleleng Regency can function better and contribute to environmental sustainability.

3.8. Financial Viability

The availability and affordability of waste management services in Buleleng Regency show varying perspectives among respondents. One respondent gave a positive score, while one was neutral, and two others were negative. The positive respondent assessed that the services are quite affordable, including low-income groups, while the negative respondents expressed concerns about access difficulties for the poorest communities. To improve service availability, it is essential to involve all stakeholders in formulating inclusive solutions based on community needs.

Perceptions regarding spending on the waste management system also vary, with one respondent giving a positive score and two others negative. The positive respondent sees effective spending, while the negative ones feel that budget allocations do not reflect actual needs on the ground. Increasing transparency and accountability in budget usage, as well as involving stakeholders in planning, will help ensure that allocated funds provide maximum benefits for the community.

Aspects of financial sustainability in managing the 3R system show diverse views, with one positive and two

neutral or negative respondents. The positive respondent assesses that financial arrangements support program sustainability, while the negative ones are concerned about optimizing financial management. To enhance financial arrangement support, it is essential to strengthen financial management and involve stakeholders in budget planning. Furthermore, feasibility studies before establishing a 3R system are vital to ensure that the facilities are built aligned with local needs and potential for sustainable functioning.

3.7. Implementation Capacity

The use and evaluation of policy instruments in waste management in Buleleng Regency show unsatisfactory results, with all respondents giving neutral scores. This reflects a consensus that existing policies have not been implemented or evaluated effectively, raising doubts about their effectiveness in promoting desired behavioral changes. To achieve sustainable waste management, there is a need for the development of more appropriate policy instruments and systematic evaluation mechanisms that involve all stakeholders in the policy-making process.

The level of compliance with regulations and laws in waste management varies among stakeholders. Two respondents gave high positive scores, demonstrating a strong commitment to complying with regulations, while one neutral respondent noted that some parties may not fully comply. To enhance compliance, it is important to conduct ongoing socialization and education for all parties, as well as design regulations that fit local characteristics to be more accepted by the community.

The level of readiness to face changes in the waste management system also shows varying perspectives. One respondent gave a positive score, noting efforts to improve readiness through training, while other respondents noted challenges in field implementation. Village preparedness largely depends on the knowledge and skills of the community and the village government in managing waste. Proper training and education can help increase the village's readiness to face challenges related to waste management, allowing them to keep the environment safe and manage waste effectively.

4. Conclusions

The governance capacity for waste management in Panji Anom Village can be assessed through nine key conditions in the Governance Capacity Framework (GCF), including stakeholder engagement and readiness to face environmental challenges. Generally, there is strong political will and community support, but significant challenges remain, particularly in service accessibility and limited financial resources. Although the governance framework is solid, its practical implementation still needs to be strengthened to achieve long-term sustainability and effectiveness.

Factors that facilitate the implementation of the 3R system in Panji Anom Village include active stakeholder involvement, cohesive policies, and continuous learning processes. The involvement of visionary agents in driving local change creates support for innovation, while efforts to align policies promote the sustainability of the waste management system. Additionally, cross-stakeholder collaboration facilitates policy improvements based on best practices.

However, there are also hindering factors in the implementation of the 3R system, such as low service accessibility, a lack of financial resources, and limited commitment from various parties. Infrastructure limitations and high service costs make it difficult for communities to access 3R facilities. Moreover, dependence on external aid and a lack of transparency also hinder effective implementation.

To enhance the governance capacity of waste management, several strategic recommendations include improving service accessibility, enhancing information transparency, diversifying financial resources, and strengthening local capacities. The village government needs to build more infrastructure and provide subsidies, as well as increase community involvement in decision-making. Forming partnerships with the private sector and non-governmental organizations is also crucial for creating sustainable solutions. By focusing on these aspects, the implementation of the 3R system in Panji Anom Village can become more effective and sustainable.

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