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Implementation of Smart Village in Strengthening Socio-Economic and Environmentally Based Waste Management System in Blahkiuh Village, Badung Regency, Bali Province to Support the Achievement of SDGs

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Abstract

Waste management remains a major challenge in rural areas of Bali due to increasing household activities, tourism development, and changes in consumption patterns. These conditions generate complex social, economic, and environmental problems, particularly in villages with limited institutional capacity and community participation. Desa Blahkiuh, Badung Regency, Bali Province, faces similar challenges in achieving sustainable waste management. The Smart Village approach is considered a relevant strategy to integrate governance, community participation, social innovation, and appropriate technology in addressing local environmental issues. This study aims to analyze the implementation of the Smart Village approach in strengthening a waste management system based on social, economic, and environmental dimensions in Desa Blahkiuh and its contribution to achieving the Sustainable Development Goals (SDGs). This research employs a qualitative descriptive method with a case study approach, using in-depth interviews, observation, and documentation as data collection techniques. The findings indicate that the implementation of Smart Village enhances community participation, increases the economic value of waste through circular economy practices, and improves environmental quality at the village level. These results demonstrate that Smart Village–based waste management contributes to the achievement of SDGs, particularly Goal 11 (Sustainable Cities and Communities), Goal 12 (Responsible Consumption and Production), and Goal 13 (Climate Action)

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1. INTRODUCTION

Waste management is one of the structural issues faced by villages in Bali, along with increasing social and economic activity and changes in community consumption patterns. Population growth, intensified tourism activities, and modernized lifestyles have resulted in an increasing volume and diversity of household waste. In this context, the waste problem is not only an environmental issue but also closely related to the social and economic aspects of village communities. Weak collective awareness, limited community participation, and minimal economic value generated from waste management are factors that worsen the environmental conditions of villages in Bali (Suryani, 2018). The subsequent impacts of these problems are seen in declining environmental quality, impaired public health, and weakened village socio-economic resilience.

From a socio-economic perspective, waste management in Balinese villages is still viewed as a burden, rather than a potential resource. Waste has not been fully recognized as an economic

commodity that can be managed through circular economic approaches, such as waste banks, recycling, or strengthening environmentally-based micro-enterprises. As a result, opportunities for creating added economic value and improving the welfare of rural communities are suboptimal. From a social perspective, low environmental literacy and weak village institutions in waste management have resulted in sporadic and unsustainable community participation. This situation demonstrates that the waste problem in Bali is a multidimensional one that requires an integrative approach, not solely a technical solution (Ministry of National Development Planning/Bappenas, 2020).

The challenges facing villages in managing waste sustainably are increasingly complex when faced with limited resources, including human resources, institutions, and technological support. Many villages still rely on conventional management systems that emphasize collection and final disposal, without strengthening aspects of waste reduction, sorting, and reuse. Furthermore, coordination between village actors—village government, communities, indigenous groups, and local economic actors—is not yet optimal. These challenges highlight the need for a village development model that simultaneously and sustainably integrates social, economic, and environmental dimensions.

In this context, the Smart Village approach emerged as an innovative alternative in village development. Smart Village is understood not only as the utilization of digital technology but also as a village governance approach that emphasizes community participation, strengthening local institutions, intelligent resource utilization, and sustainable development (Naldi et al., 2019). Through this approach, villages are encouraged to manage local issues, including waste management, by utilizing knowledge, social innovation, and technology appropriate to local socio-cultural characteristics. Thus, Smart Village becomes relevant to address the problem of waste management in Balinese villages, which requires adaptive and participatory solutions.

Furthermore, the implementation of Smart Village has a close relationship with the global sustainable development agenda or Sustainable Development Goals (SDGs). Strengthening Smart Village-based waste management systems directly contributes to the achievement of the SDGs, particularly those related to sustainable settlements (SDG 11), responsible consumption and production (SDG 12), and action on climate change (SDG 13). Through integrated waste management, villages play a role not only in preserving the environment but also in creating a balance between economic development and social sustainability (UNDP, 2021). Therefore, Smart Village can be positioned as a strategic instrument in supporting the achievement of SDGs at the local level.

Although various studies have been conducted on waste management and Smart Villages, most research still treats the two issues separately. Research on waste management generally focuses on technical and environmental aspects, while Smart Village studies focus more on village digitalization and public services. Integration between Smart Village implementation and strengthening social, economic, and environmental waste management systems, particularly in the context of villages in Bali, remains relatively limited. Furthermore, studies linking Smart Village implementation to its contribution to achieving the SDGs at the village level have not been explored in depth. This situation indicates a research gap that needs to be filled through empirical studies based on the local context.

Based on the description, this study aims to analyze the implementation of Smart Village in strengthening the social, economic, and environmental-based waste management system in Balinese villages, with a focus on Blahkiuh Village, Badung Regency. This study focuses on how the Smart Village approach is applied in waste management, the resulting impacts on social, economic, and environmental aspects, and its contribution to the achievement of the SDGs. Thus, this study is expected to provide theoretical contributions in the development of Smart Village studies and waste management, as well as practical contributions to the formulation of sustainable village development policies.

Figure 1. Interview with the Head of Blahkiuh Village, Abiansemal District, Badung, regarding the Implementation of Smart Village in Strengthening the Socio-Economic and Environmental-Based Waste Management System in Blahkiuh Village, Badung Regency, Bali Province to Support the Achievement of SDGs
(Source: KKN PMM Period I, Warmadewa University 2026)

2. METHOD

This research uses a qualitative approach with a descriptive and case study approach. The descriptive qualitative approach was chosen because this study aims to deeply understand the Smart Village implementation process in strengthening the waste management system and its impact on social, economic, and environmental aspects at the village level. This approach allows researchers to explore the meanings, perceptions, and social dynamics that develop in the local context holistically and contextually (Creswell, 2014). The case study is used to focus the analysis intensively on a single research location to provide a comprehensive empirical picture of the phenomenon being studied (Yin, 2018).

The research location was determined to be Blahkiuh Village, Badung Regency, Bali Province. This location was chosen based on the consideration that Blahkiuh Village has a growing socio-economic dynamic and faces waste management issues that require an innovative and sustainable approach. Furthermore, this village demonstrates efforts to strengthen village governance and community participation relevant to the implementation of the Smart Village concept. Thus, Blahkiuh Village is seen as a representative context for studying the implementation of Smart Village. Smart Village in waste management in the Bali region.

Research informants were determined purposively, selected based on their involvement and knowledge of waste management issues and Smart Village implementation in the village. Key informants in this study included village officials, managers or administrators of village waste management activities, community leaders, and community representatives directly involved in waste processing activities. Purposive selection of informants aimed to obtain relevant, in-depth data that aligned with the research focus (Sugiyono, 2019).

Data collection techniques in this study were conducted through in-depth interviews, observation, and documentation. In-depth interviews were used to explore informants' views, experiences, and understanding regarding implementation. Smart Village and waste management in Blahkiuh Village. Observations were conducted to directly observe the village's environmental conditions, waste management practices, and forms of community participation in these activities. Meanwhile, documentation was used to supplement the research data through a review of official village documents, activity reports, photographs, and other archives relevant to the research. The combination of these three techniques enabled researchers to obtain richer and more in-depth data (Moleong, 2017).

Data analysis was conducted using descriptive qualitative methods, including data collection, data reduction, data presentation, and conclusion drawing. Data obtained from interviews, observations, and documentation were analyzed by grouping key themes related to implementation. Smart Village, waste management systems, and the resulting social, economic,

and environmental impacts. This analysis process was carried out iteratively and reflectively to ensure that the research findings reflected empirical conditions in the field (Miles, Huberman, & Saldaña, 2014).

The validity of the data in this study was ensured through triangulation techniques. Triangulation was conducted by comparing data obtained from various sources, data collection techniques, and various data collection times. Source triangulation was used to compare information from village officials, community leaders, and the general public, while method triangulation was conducted by comparing the results of interviews, observations, and documentation. Through this triangulation technique, research data is expected to have a high level of validity and credibility, so that research findings can be scientifically accounted for (Denzin, 2017).

Figure 2. Socialization Activities

3. RESULTS AND DISCUSSION

Implementation of Smart Village in Waste Management System

The implementation of Smart Village in the waste management system in Blahkiuh Village is characterized by the involvement of multiple interacting actors, namely the village government, the community, and other local actors. The village government plays a key role in formulating village policies, facilitating institutions, and providing administrative support in waste management. This role is evident in the village government's efforts to promote a community-based waste management system, including strengthening waste management groups and integrating waste management programs into village development planning. The village government's facilitative and coordinating role reflects the principles of good governance. *Smart Village*, *which* emphasizes collaboration and participation (Naldi et al., 2019).

Village communities are key actors in the implementation of Smart Villages, particularly in the technical implementation of waste management. Community involvement is evident in waste sorting activities at the source, participation in community-based waste processing activities, and involvement in environmental education and outreach forums. This participation demonstrates a paradigm shift in the community from mere recipients of policies to active subjects in village environmental management. Furthermore, local actors such as traditional leaders, community groups, and local businesses contribute to strengthening the waste management system through social support, strengthening collective norms, and developing the economic value of waste. This synergy between actors reflects the implementation of Smart Villages. *Smart Village, which* not only relies on technology but also on strengthening local social and institutional relations (Visvizi & Lytras, 2018).

Social Impact: Community Participation and Behavior Change

The implementation of Smart Village in waste management in Blahkiuh Village has had a significant social impact, particularly in increasing community participation. Community participation extends beyond physical involvement in waste management activities to the decision-making process and activity planning at the village level. This involvement strengthens community ownership of the waste management program, thereby enhancing its sustainability. Inclusive and sustainable participation is a crucial indicator of the success of community-based waste management (Suryani, 2018).

In addition to increasing participation, the implementation of *Smart Village* also encourages behavioral changes and increased environmental awareness in village communities. Communities are beginning to understand the importance of waste sorting, reducing plastic use, and the long-term impacts of waste management on health and environmental quality. This behavioral change does not occur instantly, but rather through a social learning process involving education, role models from local actors, and the strengthening of social norms. From a socio-humanities perspective, this change in behavior and environmental awareness reflects the social transformation process that is at the heart of the Smart Village approach (Bastidas & Guillermo, 2020).

Economic Impact: Increasing the Economic Value of Waste and Strengthening the Local Economy

From an economic perspective, strengthening the Smart Village-based waste management system has increased the economic value of waste in Blahkiuh Village. Previously viewed as waste, waste is now being utilized as an economic resource through sorting, processing, and recycling. This practice aligns with the principles of a circular economy, which emphasizes the creation of added value through sustainable resource management (Geissdoerfer et al., 2017). Through more structured waste management, village communities gain opportunities for additional income, both directly and indirectly.

Furthermore, waste management is based on *Smart Village.* It also contributes to strengthening the local economy and village institutions. Waste management activities encourage the formation of community groups that function as both economic and social units. This institutional strengthening strengthens villages' capacity to manage local economic potential independently and sustainably. In the context of village development, strengthening the local economy through waste management is an alternative strategy for improving community welfare without sacrificing environmental sustainability (Ministry of National Development Planning/Bappenas, 2020).

Environmental Impact: Reducing Waste Volume and Improving Village Environmental Quality

The implementation of Smart Village waste management also has a positive impact on the village environment. One of the most obvious impacts is the reduction in the volume of unmanaged waste. Through waste sorting at the source and community-based processing, the amount of waste disposed of in landfills can be significantly reduced. This reduction in waste volume not only lessens the environmental burden but also reduces the potential for soil and water pollution in the village area.

Furthermore, more integrated waste management has contributed to improving the environmental quality of Blahkiuh Village. The residential environment has become cleaner and healthier, ultimately positively impacting the community's quality of life. This improved environmental quality demonstrates that waste management is not merely a technical issue, but an integral part of sustainable village development. This success is greatly influenced by the collective awareness and social commitment of the village community to environmental protection (UNDP, 2021).

Contribution to the Achievement of SDGs

The social, economic, and environmental impacts resulting from the implementation of Smart Village in waste management contribute directly to the achievement of *Sustainable Development Goals* (SDGs) at the village level. Improving environmental quality and strengthening village settlements support the achievement of SDG 11 on inclusive, safe, and sustainable settlements. Community participation and strengthening village governance also strengthen social resilience, a key indicator of SDG 11 (United Nations, 2019).

Contributions to SDG 12 are evident in changes in consumption and production patterns in rural communities through the application of circular economy principles. Smart Village-based waste management encourages communities to be more responsible in managing waste through reduction, reuse, and recycling. Meanwhile, reducing the environmental impact of waste and increasing awareness of environmental conservation contribute to the achievement of SDG 13,

which addresses climate change action. Therefore, the implementation of Smart Villages in waste management not only provides local benefits but also significantly supports the global sustainable development agenda (Ministry of National Development Planning/Bappenas, 2020; UNDP, 2021).

4. CONCLUSION

Based on the research results and discussion, it can be concluded that the implementation of Smart Village plays a significant role in strengthening the social, economic, and environmental waste management system in Blahkiuh Village, Badung Regency, Bali Province. The Smart Village approach enables the integration of participatory village governance, strengthening local institutions, and the active involvement of the community and local actors in waste management. This implementation not only improves the technical aspects of waste management but also encourages sustainable social and behavioral changes in the village community.

Strengthening the waste management system through the Smart Village approach produces multidimensional impacts. Social impacts are reflected in increased community participation, growing environmental awareness, and strengthening village social capital. Economic impacts are evident in the increasing economic value of waste, the development of local economic activities based on circular economy principles, and the strengthening of village institutions in managing environmental economic potential. Meanwhile, environmental impacts are demonstrated through a reduction in the volume of unmanaged waste and an improvement in the quality of village residential environments. Overall, these findings indicate that Smart Village is a relevant and effective approach to supporting sustainable waste management at the village level (Naldi et al., 2019; Geissdoerfer et al., 2017).

In terms of theoretical implications, this research strengthens the social and humanities perspective on Smart Villages as a social transformation process that emphasizes participation, collaboration, and strengthening local capacity, rather than solely the application of technology. This research also expands the study of waste management by placing it within the framework of sustainable village development integrated with the SDGs agenda. Thus, this research contributes to the growing literature on the link between Smart Villages, waste management, and the achievement of the SDGs at the local level.

Recommendation

Based on these conclusions, this study recommends that village governments continue to strengthen the implementation of Smart Villages through village policies that encourage community participation and strengthen waste management institutions. Village governments need to ensure the sustainability of the program by integrating waste management into village development planning and providing support for the capacity development of communities and waste management groups. Furthermore, strengthening collaboration with local actors, including traditional institutions and businesses, is crucial to maintaining the sustainability of community-based waste management systems.

For local governments, this study recommends the need for policy support and facilitation for villages implementing the Smart Village approach to waste management. This support can include providing technical assistance, strengthening regulations, and integrating village programs with regional development policies and the SDGs agenda. Local governments are also expected to encourage the replication of Smart Village-based waste management best practices in other villages, while still considering the social and cultural characteristics of each region (Ministry of National Development Planning/Bappenas, 2020).

As a suggestion for further research, this study recommends conducting similar studies with a broader scope or using a comparative approach between villages to gain a more comprehensive understanding of the effectiveness of Smart Villages in waste management. Furthermore, further research could develop quantitative or mixed methods approaches to more specifically measure the social, economic, and environmental impacts of Smart Village implementation. Further

research could also delve deeper into the role of digital technology and social innovation in strengthening villages' contributions to achieving the SDGs at the local level (UNDP, 2021).

5. BIBLIOGRAPHY

Bastidas, S., & Guillermo, P. (2020). Smart villages and rural development: A social innovation perspective. *Sustainability, 12*(12), 1–15. https://doi.org/10.3390/su12124819

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: SAGE Publications.

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The circular economy: A new sustainability paradigm? *Journal of Cleaner Production, 143*, 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048

Kementerian Perencanaan Pembangunan Nasional/Bappenas. (2020). *Pedoman pelaksanaan pencapaian tujuan pembangunan berkelanjutan (SDGs)*. Jakarta: Bappenas.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Moleong, L. J. (2017). *Metodologi penelitian kualitatif* (Edisi revisi). Bandung: PT Remaja Rosdakarya.

Naldi, L., Nilsson, P., Westlund, H., & Wixe, S. (2019). What is smart rural development? *Journal of Rural Studies, 68*, 90–101. https://doi.org/10.1016/j.jrurstud.2019.02.006

Sugiyono. (2019). *Metode penelitian kualitatif, kuantitatif, dan R&D*. Bandung: Alfabeta.

Suryani, A. S. (2018). Peran bank sampah dalam pengelolaan sampah berbasis masyarakat. *Jurnal Aspirasi, 9*(2), 171–182. https://doi.org/10.22212/aspirasi.v9i2.1105

United Nations Development Programme. (2021). *SDGs and local action: Advancing sustainable development through local governments*. New York: UNDP.

United Nations. (2019). *The sustainable development goals report*. New York: United Nations.

Visvizi, A., & Lytras, M. D. (2018). Sustainable smart cities and smart villages research. *Sustainability*, *10*(2), 1–16. https://doi.org/10.3390/su10020425