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Implementing Circular Economy Model In Rural Eco-tourism: A Case Study From Bandung

Lusianus Kusdibyo[1], I Gusti Ngurah Dwi Wiryawan[2], Wahyu Rafdinal[3]
Chandra Budhi Septyandi[4]

[1-4]Business Administration Departement, Politeknik Negeri Bandung

*Email: dwi.wiryawan@polban.ac.id

Abstract

This study examines the implementation of the Circular Economy Business Model (CEBM) in rural eco-tourism through a case study of Cikahuripan Village, Bandung. It explores how circular economy principles can support environmental sustainability, improve waste management, and enhance local economic resilience amid infrastructural, financial, and technological limitations. A qualitative approach was employed using in-depth interviews and focus group discussions involving community leaders, tourism actors, and policymakers. The findings highlight three major barriers, namely ineffective waste handling, weak financial mechanisms to sustain recycling initiatives, and low adoption of digital tools. These constraints undermine the viability of community-based eco-tourism efforts. The study recommends improving infrastructure, providing incentives for eco-friendly enterprises, and expanding digital literacy. Strengthening multi-stakeholder collaboration and encouraging visitor participation in conservation activities are also essential for fostering sustainable tourism in rural areas.

Keywords: Circular Economy, Rural Eco-tourism, Waste Management, Digital Inclusion, Sustainability

A. INTRODUCTION

The integration of sustainability principles into the tourism industry is increasingly important, especially with the growing global concern about the environmental impacts of conventional tourism models. The gap between industrial development and ecological preservation has prompted the emergence of the circular economy as a viable framework for achieving sustainable tourism. By adopting the Circular Economy Business Model (CEBM), the tourism sector can extend the life cycle of resources, minimize waste generation, and improve the welfare of local communities. (Hu et al., 2019; Wondirad et al., 2020). Although the potential benefits of CEBM implementation have been widely recognized, its implementation in rural areas presents its challenges, particularly related to limited infrastructure, resource availability, and stakeholder engagement. Successful implementation requires strong collaboration between local governments, community members, and private sector actors to ensure environmental sustainability as well as economic sustainability. Starting from this context, this research explores the case study of Cikahuripan Village, which reveals the opportunities and obstacles in applying circular economy principles in the context of smart eco-tourism.

One of the principal challenges identified in Cikahuripan Village is the inadequate waste management system, which significantly affects both environmental quality and community well-being. Although there are sporadic environmental clean-up initiatives carried out by the community, the lack of formal infrastructure has led many residents to choose to burn waste, which ultimately worsens environmental damage (Mihai, 2018). This emphasizes the importance of not only educating the community about environmental awareness but also providing supporting infrastructure and a regulatory framework to facilitate the implementation of sustainable practices in practice. Awareness campaigns alone, without adequate infrastructure support, are not enough to drive long-term behavioral change. Beyond environmental issues, economic sustainability is also a pressing concern. Previous efforts, such as the establishment of community waste banks aimed at encouraging recycling and generating additional income, have struggled due to financial instability. The findings of this study suggest that integrating circular economy principles into local entrepreneurship and incentivizing environmentally friendly business models are essential to ensuring the sustainability of sustainable tourism initiatives (Suchek et al., 2021).

* Corresponding author

This is in line with a broader theoretical consensus that sustainable tourism development requires an integrated approach of financial support, policy, and community participation.

Community engagement has also emerged as a critical pillar for the success of smart eco-tourism. Educational activities—including biodiversity tours and tree-planting workshops—have contributed to increasing environmental awareness among both residents and visitors. However, long-term success depends largely on active community participation and ongoing capacity building (Tiberghien et al., 2017). Combining local knowledge with formal environmental education is key to building a resilient and adaptive eco-tourism framework. However, the adoption of smart technology remains a significant obstacle in the development of eco-tourism in Cikahuripan Village. Although digital tools and IoT-based solutions offer the potential to improve tourist experience and operational efficiency, rural areas such as Cikahuripan face challenges such as inadequate digital infrastructure and limited financial resources. Stakeholders emphasized the need for collaboration between the public and private sectors to expand digital access and targeted training initiatives so that communities have the skills needed to utilize smart tourism technology (Buhalis, 2020). Therefore, investment in digital inclusion is a strategic prerequisite for realizing the full potential of smart eco-tourism.

To address these challenges, this study offers an approach that combines local potential, active community participation, and the use of technology to develop tourism in Cikahuripan Village more optimally. By implementing the principles of the Circular Economy Business Model (CEBM) combined with the concept of smart eco-tourism, it is hoped that a stronger and more sustainable rural eco-tourism will be created. However, for this program to be successful in the long term, solid cross-sector collaboration is needed to address waste management issues, support economic resilience, and bridge the gap in access to technology. The potential for implementing CEBM in the tourism sector has been widely recognized, but its implementation in rural areas faces a number of obstacles, especially in areas with limited infrastructure, limited funds, and technology adoption. One of the shortcomings that was also identified was the lack of research that specifically discussed the problems of waste management, economic sustainability, and technology integration in rural areas that are still lagging. Therefore, this study aims to explore how the principles of a circular economy can be applied effectively in rural eco-tourism, which is to overcome the challenges of waste management and strengthen economic sustainability while exploring the role of digital inclusion in supporting circular economy strategies in the eco-tourism sector.

B. LITERATURE REVIEW

Circular Economy in Sustainable Tourism

The concept of the circular economy has emerged as essential for sustainability in the tourism sector, especially as global concerns grow about the environmental impacts of conventional tourism models. (Geissdoerfer et al., 2017) emphasize that within a circular economy framework, production processes or services can be successful based on the principles of ecological sustainability, supported by ideas such as the sharing economy and the performance economy. These approaches have the potential to benefit not only local communities but also the natural environment. In the tourism sector, the application of circular economy principles is particularly relevant given the high consumption of resources and the large amount of waste generated, which are key challenges to sustainability. A SWOT analysis to assess the feasibility of circular practices confirms that effective waste management is a prerequisite for sustainable tourism development (Falcone, 2019). These cases emphasize the importance of aligning tourism initiatives with ecological sustainability principles to achieve long-term resilience.

Despite its widely recognized benefits, the transition to a circular economy in the tourism sector is not without its challenges. Regions that still lack recycling infrastructure and adequate waste management systems often face barriers to the implementation of circular economy practices. (Martins & Cró, 2021), assert that the rapid growth of tourism in Madeira Island has led to an increase in solid waste production that burdens waste disposal systems, especially in less developed areas. In addition, the effectiveness of circular economy projects is also influenced by consumer behavior. (Puiu et al., 2022) argue that the attitudes of younger generations, such as Generation Z's commitment to recycling, play a significant role in determining sustainable tourism choices. Their high awareness and acceptance of environmental sustainability practices have been identified as key drivers in advancing circular economy solutions in the tourism sector. This is a consideration that tourism businesses need to adapt their operations to align with sustainability principles in order to maintain competitiveness and relevance in a changing global context.

Smart Tourism in a Rural Context

The implementation of the Smart Tourism concept in rural areas requires adjustments to local technical and infrastructure conditions, including within the scope of digital access, low digital literacy, and minimal funding for high-tech implementation. For example, the Eco-bnb platform in Italy demonstrates the successful integration of digital technology and big data to promote sustainable accommodation while also showing how smart tourism and circular economy goals can be closely intertwined (del Vecchio et al., 2022). Their success shows that although digital infrastructure in rural areas is not yet on par with urban areas, adequate human resources and a supportive physical environment can be important capital in the development of Smart Tourism.

Various low-cost digital solutions, such as mobile phone-based applications and community internet centers, have been proposed to increase community participation in the rural tourism sector (Saputra et al., 2023; Sheila et al., 2024). In addition, information and communication technology (ICT) plays an important role in the governance of rural development, education, and the provision of public services. This role further strengthens the development of the smart village concept (Saputra et al., 2023). Digital literacy programs are also crucial so that the use of technology can run optimally (Puspita, 2024), while digital marketing strategies have proven effective as a low-cost solution in increasing the competitiveness of the rural tourism sector. The integration of the smart city concept into national and regional development strategies is expected to increase the efficiency of resource utilization while strengthening the resilience of rural areas. The literature review shows the importance of area-based initiatives that emphasize digital inclusion as a common goal for the community. Thus, digital connectivity not only accelerates development in rural areas but also supports the growth of the tourism sector in the region.

Cross-Sector Stakeholder Collaboration

Regarding government support and its role in sustainable tourism, composting facilities can help increase employment while having a positive impact on the environment (Camilleri, 2021). Public-Private Partnerships (PPPs) are very important to encourage the creation of a sustainable chain in the tourism sector. (Geissdoerfer et al., 2017), emphasized the importance of clear government policies so that collaboration between the public and private sectors can be established effectively to achieve sustainability goals. However, limited resources, inadequate infrastructure, and low adoption of technology in rural areas are obstacles to their participation in partnerships, as found in tourism services. This condition triggers a gap in benefits between developing tourism areas and urban areas (Jones & Hills, 2021). Therefore, joint efforts are needed from all stakeholders through integrated strategies, including the application of eco-tourism and circular economy principles (Vargas-Sánchez, 2018). A local economy based on regional potential can encourage relationships between business actors and communities while maintaining sustainability and productivity. By involving local communities more closely, the tourism sector not only benefits from labor and management cost efficiencies but also increases opportunities for sustainability and future development (Rahman & Baddam, 2021).

Community-Based Tourism (CBT) and Circular Economy

Community-Based Tourism (CBT) is increasingly seen as a pathway to sustainable tourism in rural areas by emphasizing the participation and benefits of local communities. (Bozdaglar, 2023), shows how CBT initiatives can improve community well-being through the creation of economic opportunities and strengthening social cohesion, while (Huda et al., 2024) discuss the importance of balancing social change and environmental sustainability. Most of these studies focus on contexts with relatively strong community organizations and external support, raising questions about the relevance of this model in rural Indonesia and may have limitations in these capacities.

(Yutthaworakool et al. 2024; Hamdani et al. 2023) describes responsible tourism practices that can provide benefits to the environment and local economy, but in their findings, assume that communities have sufficient resources and knowledge to manage tourism effectively. (Aji, 2024; Riady et al. 2024) highlighted the importance of utilizing local wisdom and developing agritourism, but few studies have critically examined how these strategies can be applied to circular economy principles in real contexts. In the words of (Mtapuri et al., 2022), the study explains the existence of stronger collaboration between partners between government, the private sector, and communities to strengthen CBT; practical challenges such as power imbalances and resource constraints are often unresolved. It is important to understand how CBT can effectively integrate circular economy practices in rural Indonesia, taking into account the unique social, economic, and environmental contexts that shape tourism development at the local level.

Socio-Ecological Systems (SES) Theory

The integration approach with social-ecological systems (SES) is critical for environmental conservation and economic development to maintain the equilibrium. Indeed, the more resilient a tourist socio-ecological ecosystem system is to external forces, such as increased levels of tourism, so much the better its facilities for resource management (Zhenying et al., 2024). Several studies have emphasized that stakeholder involvement in SES studies is a key factor in understanding the interactions between local communities and their environment, which in turn contributes to the effectiveness of natural resource management (Herrera-Franco et al., 2018). In addition, (Liu & Suk, 2021) study showed that a balance between tourism economic activity and ecological health is a prerequisite for long-term sustainability. Based on an analysis of sustainable wine tourism, (Trišić et al., 2019) found that the use of local tradition and environmental knowledge could contribute to greater sustainability for tourism. (Andalecio et al. 2022) also found that the involvement of the community in planning its tourism structure led to greater social and political resilience. On the other hand, (Juma & Khademi-Vidra, 2019) argued for the development of human capital and Education programs that would best equip local communities with the tools needed to manage tourism sustainably. Although SES Theory provides a robust framework for analyzing tourism impacts, there is still a research gap in adapting SES principles to the socio-economic and cultural context of rural Indonesia, where resource constraints and community capacity can impact the outcomes achieved.

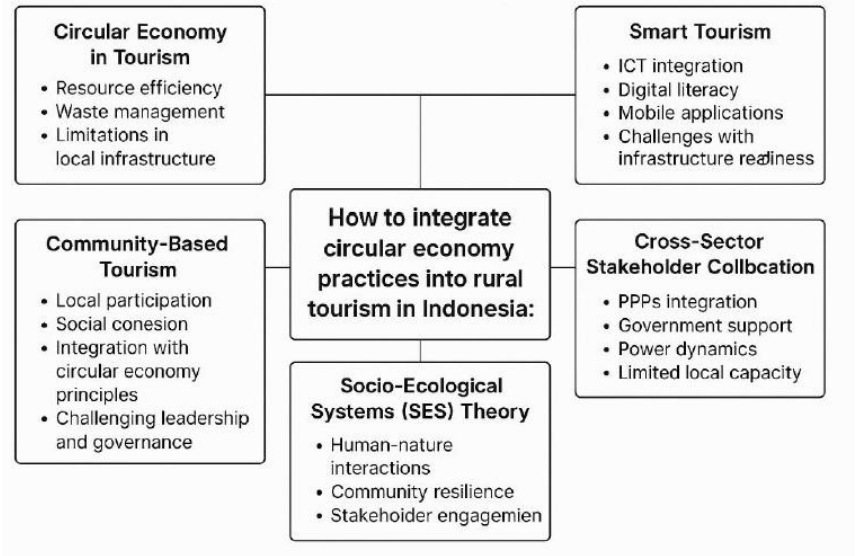


Figure 1. Conceptual Framework for Implementing Circular Economy in Rural Eco-tourism
Source: Research data, 2025

C. METHODS

A qualitative approach was adopted to explore how local stakeholders involved in developing eco-tourism models perceive sustainability, circular economy practices, and associated challenges. This approach was chosen because certain elements, such as community experiences and social dynamics, are best captured through in-depth, non-quantitative methods (Creswell, J. W., & Poth, 2016; Patton, 2015). D Data were collected through semi-structured interviews and focus group discussions (FGDs), each lasting between 90 and 120 minutes. A total of 16 participants were selected using purposive sampling based on criteria such as their direct involvement in tourism, conservation, and local entrepreneurship, as well as their knowledge of community-based and circular economy practices. This included a moderator, five research team members, five students, and six key informants (tourism managers, biodiversity conservation coordinators, culinary entrepreneurs, fisheries cultivation managers, and agrotourism practitioners). This diversity ensured that different perspectives on sustainability and circular economy implementation were represented.

The sample size was considered sufficient because data saturation was reached after analyzing the 16 interviews and FGDs, with no new themes emerging from subsequent data (Braun, V., & Clarke, 2006). A thematic analysis approach to identify themes that addressed the research objectives. This rigorous process ensured that the data collected were relevant and comprehensive for addressing the study's aims. Ethical

considerations were strictly followed, with informed consent obtained from all participants and privacy maintained (Hammersley, M., & Atkinson, 2007).

D. RESULTS AND DISCUSSIONS

Stakeholder Viewpoints for Sustainable Infrastructure

Waste management is a major challenge in Cikahuripan Village, with many residents still burning waste due to the lack of adequate processing facilities. This has led to environmental damage and reduced eco-tourism appeal (Kazuva et al., 2018; Mihai, 2018). While regular community clean-ups demonstrate local commitment, participants agreed that there is inadequate infrastructure and government support. Participant 1 noted, "Residents clean up regularly, but waste is still burned," while Participant 2 confirmed, "Yes, it is still burned." This observation is in line with (Falcone, 2019) findings that infrastructure gaps hinder circular economy practices despite community enthusiasm for CEBM. Economic sustainability emerged as another major concern, with Participant 2 sharing how a waste bank project was discontinued due to returns being too low to sustain. This reflects the broader challenges identified by (Mihai, 2018) and is in line with SES Theory's emphasis on balancing environmental and economic objectives (Herrera-Franco et al., 2018; Liu & Suk, 2021). Community efforts to engage in recycling and conservation practices highlight the need for integrated policies and strong local support. Participant 2 emphasized, "*Communities care about waste management, but awareness alone is not enough; it needs a proper system.*" This is in line with (Yutthaworakool et al., 2024), who noted that enthusiasm for recycling often stagnates without adequate government support. These findings suggest that achieving sustainable eco-tourism in Cikahuripan Village requires more than just community awareness; it also relies on strong infrastructure, consistent policies, and collaborative governance. Investing in waste management systems, integrating community-led initiatives, and aligning them with circular economy principles can help bridge this gap, as recommended by (Suchek et al., 2021). Addressing these interrelated challenges is critical to transforming local eco-tourism into a better, environmentally responsible, and economically viable industry.

Building Awareness and Strengthening Community Engagement in Sustainability

Building local awareness and strengthening community engagement is essential to advancing sustainable eco-tourism in Cikahuripan Village. Regular monthly environmental maintenance activities, such as clean-up days, are an important part of these efforts. Participant 1 shared, "*We always give a schedule in advance. Every Sunday, the community comes together to clean the area and clean the drainage channels.*" This initiative, coordinated by the local community council, aligns with (Zhang et al., 2023), who emphasized that participatory events can foster a sense of collective responsibility and ownership—core principles of Community-Based Tourism (CBT). However, as Participant 3 noted, "*It is not easy to get everyone on board. You cannot just do it once and expect lasting change—it takes continuous Education and reminders.*" This highlights the importance of ongoing community engagement. Integrating local ecological knowledge and cultural values makes sustainability programs more meaningful and effective (Terzić et al., 2020). Participant 4 added, "*We organize environmental education tours where people can learn about biodiversity, native trees of Java, their uses, and even planting techniques.*" These programs reflect (García-González et al., 2022) findings that workshops and discussions empower communities to take an active role in sustainable tourism.

Beyond formal tourism, hands-on learning initiatives also play a significant role. Participant 5 described a workshop on organic farming, saying, "*Farmers now have access to environmentally friendly alternatives.*" This approach highlights that transformative education fosters critical thinking and problem-solving skills, which are essential for addressing sustainability challenges (Tiberghien et al., 2017). Integrating local environmental knowledge into school curricula can further strengthen community ownership and create sustainable practices that last. (Pu et al., 2022) Based on the discussion above, these efforts demonstrate that education, participatory activities, and local knowledge are critical to building resilient, community-based eco-tourism models in rural Indonesia.

Strategies And Challenges Of Waste Management

Managing waste in Cikahuripan Village remains a persistent challenge, largely due to limited resources and inadequate infrastructure. Participant 1 explained, "*Right now, there is no proper system for handling waste. We usually burn it.*" This reflects a common problem in rural tourism areas, where lack of infrastructure often leads to environmental damage (Mihai, 2017). Without a structured plan, waste management continues to affect

both the environment and residents' daily lives, highlighting the dual challenge of environmental necessity and lost economic opportunity. Participants described attempts at eco-friendly waste management that ultimately fell short of expectations. For example, Participant 2 shared, "*We once collaborated with a waste bank and experimented with organic waste breakdown using maggots, while plastics were repurposed into paving blocks and eco-bricks. However, this method was ultimately ineffective, as it merely transformed waste into another form rather than reducing it.*" Integrating environmental goals with economic incentives is crucial for truly sustainable waste management (Masjhoer & Vitrianto, 2024)

Funding and government support emerged as critical barriers. Participant 3 recalled, "*We had a waste press machine at one point, but the project could not continue because the environmental agency would not provide the necessary equipment.*" This emphasizes the need for stronger institutional backing to develop long-term solutions. Effective waste management depends not only on local efforts but also on robust governance to secure financial and technical resources. (Debrah et al., 2021). These experiences suggest that waste management in Cikahuripan Village requires not just community enthusiasm but also integrated policies, infrastructure investment, and cross-sector collaboration to achieve sustainable outcomes.

The Role of Government and Policy in Sustainable Tourism

Government support plays a crucial role in fostering sustainable tourism in rural communities like Cikahuripan Village. Participant 1 explained, "*Government assistance is very influential, especially in villages like ours. Not everyone has the resources to manage waste properly or build environmentally friendly tourism projects*." This adequate policy and infrastructure are essential to advance sustainable tourism in rural settings (Forleo et al., 2017). Beyond financial support, the government also contributes to managing land and natural resources, as noted by Participant 2: "*The forestry service provides seedlings for the reforestation program, but the application process is quite long and must go through official procedures*." Simplifying such processes could encourage greater community participation in conservation efforts.

However, achieving long-term sustainability requires more than one-off initiatives. Participant 3 shared, "*In the past, every family was required to plant a tree when a child was born or before they got married, but over time, this rule disappeared because no one enforced it.*" This highlights a common issue in policy implementation, where initial efforts fade without consistent enforcement or community buy-in, a challenge (Li et al., 2021). SES Theory suggests that sustainable tourism depends on the interaction between policy frameworks, community engagement, and local ecosystems (Herrera-Franco et al., 2018).

To make policies effective, they should not only be well-designed but also consistently implemented, supported by training and technology that empower communities to adopt eco-friendly practices (Forleo et al., 2017). Looking ahead, inclusive policies that involve community voices in decision-making can enhance tourism governance and balance economic development with environmental sustainability. Lessons from other rural contexts, such as in Thailand (Yutthaworakool et al., 2024), show that participatory policymaking can strengthen local ownership and support for sustainable tourism initiatives.

Impact on the Economy and Job Creation

The implementation of CEBM in Cikahuripan Village has created new economic opportunities by creating jobs. Participant 1 shared, "*Eco-tourism is not only about bringing in guests but also about economic income in the community.*" This is in line with (F et al., 2019), who highlighted that well-managed eco-tourism can create job opportunities in areas such as waste management, recycling, and other environmentally friendly sustainable businesses. However, challenges remain. Participant 2 explained, "*We used to run a waste bank, where sorted waste was sold to collectors. However, the economic return was too low, only IDR 800,000–IDR 850,000 every two weeks, so the program was stopped*." This reflects (Hadad et al., 2012), who emphasized that sustainable rural development requires addressing both environmental and economic issues.

In addition to direct employment, eco-tourism has also encouraged local entrepreneurship. Participant 3 noted, "*Some visitors want to buy environmentally friendly souvenirs, which encourages creativity in local crafts and products made from recycled materials*." This supports (Zhang et al., 2022), who argue that integrating bottom-up rural economic development with conservation can empower small-scale entrepreneurs. Agricultural and conservation efforts are also integrated into tourism models. Participant 4 explained, "*We work with forestry and conservation programs to provide local plant seedlings for eco-tourism activities*." This is in line with (Mihai, 2019; Mihai, 2018), who emphasizes that combining conservation and local business growth can increase economic resilience. For Cikahuripan Village, sustainable eco-tourism can develop into a self-sustaining

economy, but this will require supportive policies, funding, and incentives to empower local entrepreneurs and ensure long-term success.

Technological Constraints and Possibilities

Limited technological infrastructure remains a major obstacle to eco-tourism development in Cikahuripan Village. While digital tools can improve marketing, visitor engagement, and resource management, inadequate internet connectivity and a lack of digital solutions can hinder progress (Buhalis, 2020). Participant 1 noted, "*Currently, there is no adequate technology to support tourism activities in this area*." This highlights the need for the next few years to build digital infrastructure, as well as improve digital literacy to support smart tourism. This was also observed by (Terzić et al., 2020) in other developing areas. Despite these obstacles, on the other hand, the village has begun to explore renewable energy initiatives. Participant 3 mentioned ongoing efforts to introduce solar panels, although this is currently still rare. This is in line with (Maying et al., 2021), who emphasized the dual role of renewable energy in promoting environmentally friendly sustainable practices and supporting economic independence. Locals have also proposed innovative ideas such as processing organic plant waste into essential oils, although equipment and funding are still constraints. Participant 4 shared, "*We had an idea to extract essential oils from lemongrass waste, but it was difficult to get the equipment we needed*." This experience underscores the importance of stronger partnerships between the public and private sectors to improve digital infrastructure and invest in sustainable eco-tourism technologies (Buhalis, 2020).

Community-Based Tourism (CBT) And Social-Ecological Systems (SES) Perspective

The Community-Based Tourism (CBT) model, supported by the Social-Ecological Systems (SES) framework, is one of the strong foundations of sustainable eco-tourism by emphasizing local ownership and biodiversity conservation (Shen et al., 2020). Participant 1 shared, "*Working with local communities keeps eco-tourism activities from destroying our habitat or disrupting traditions*," highlighting the importance of local involvement in maintaining ecological integrity (F et al., 2019). In addition, Cikahuripan Village is very open to visits from educational institutions, and environmental education has emerged as an important factor in increasing community awareness and participation. Participant 3 mentioned, "*Schools and universities visit for ecological learning activities such as tree planting and conservation workshops*," which is in line with the SES principle that emphasizes the importance of integrating local ecological knowledge into tourism management for long-term sustainability (Shen et al., 2020). Moving forward, strengthening governance structures, providing institutional support, and investing in environmental education will be essential to ensure that eco-tourism delivers socio-economic benefits while protecting local ecosystems.

Visitor Engagement

Educating visitors on eco-tourism principles is key to promoting responsible tourism in Cikahuripan Village. Participant 1 noted, "*Many visitors from schools and universities were involved in tree planting and learning about endemic plants,*" which is in line with (Zha et al., 2020) in highlighting the benefits of tourism education for fostering conservation awareness and visitor engagement. Participant 2 also emphasized guided educational experiences: "*Island eco-tourism educates visitors about native trees and their uses through interactive experiences*," reinforcing the idea that interactive learning enhances environmental responsibility and visitor satisfaction. In addition to education, immersive conservation activities can reinforce sustainable behaviors. Participant 3 shared, "*On nature tours, visitors take drinking water from natural springs instead of using plastic bottles, reducing waste while improving survival skills*." This supports (Thang & Thanh, 2023), who argue that experiential eco-tourism fosters long-term sustainability commitment. Plans for workshops on biodiversity conservation and responsible tourism, as noted by Participant 4, also reflect efforts to engage visitors in meaningful ways. Effective communication about eco-tourism values not only enhances visitor experiences but also contributes to conservation outcomes (Anh et al., 2023). Strengthening visitor education and expanding interactive conservation programs will be critical to ensuring that eco-tourism in Cikahuripan Village is sustainable and economically viable.

Table 1. Summary of Research Findings on Circular Economy Implementation in Rural Eco-tourism

No	Theme	Key Findings	Implication
1	Waste Management	Inadequate infrastructure leads to waste burning, environmental damage, and ineffective recycling efforts.	Investment in infrastructure and integrated policies is needed for sustainable waste management.
2	Community Engagement and Education	Participatory clean-up activities and ecological education are in place but require continuous effort.	Ongoing awareness campaigns and educational programs are critical to sustain engagement.
3	Economic Sustainability	Recycling programs like waste banks fail due to low returns; there is potential for eco-souvenirs and green businesses.	Financial support and incentives are needed to stimulate local entrepreneurship and eco-businesses.
4	Government Role and Policy Support	Policies exist but lack enforcement and streamlined processes; limited government support is reported.	Policies should be consistent, participatory, and supported by resources to achieve real impact.
5	Technology Constraints and Innovation	Poor digital infrastructure and limited access to smart tourism technology; some exploration of solar energy and essential oils.	Public-private collaboration is required to improve tech access and support innovation.
6	CBT and SES Integration	CBT supported by SES helps maintain ecological and cultural integrity, supported by local institutions.	Strengthening institutional support and governance is necessary for long-term success.
7	Visitor Participation	Visitors engage in educational activities, contributing to conservation awareness.	Expanding immersive and educational tourism activities can reinforce sustainability values.

Source: Research data, 2025

E. CONCLUSION

This study has shed light on the challenges and opportunities of applying circular economy principles to sustainable eco-tourism in Cikahuripan Village. The findings show that while the community is motivated and aware of environmental issues, waste management remains a major hurdle due to limited infrastructure and resources. Economic sustainability also faces challenges, with recycling initiatives struggling to generate sufficient returns and local entrepreneurship requiring stronger support. Technological limitations, particularly inadequate digital infrastructure, further restrict the potential for smart tourism and effective resource management. From a theoretical perspective, this research adds to our understanding of how Circular Economy, Community-Based Tourism (CBT), and Socio-Ecological Systems (SES) frameworks intersect in rural Indonesia. It reinforces the idea that sustainable tourism development depends on balancing environmental, economic, and social factors, aligning with SES Theory's focus on interconnectedness and resilience. For policymakers and practitioners, the findings underscore the need to invest in waste management systems, simplify government procedures, and support local entrepreneurship to strengthen economic resilience. Improving digital connectivity and providing targeted training can also help communities adopt sustainable practices more effectively. Future research could expand on these insights by exploring other rural contexts with diverse socio-economic and cultural characteristics. Combining qualitative and quantitative methods could offer a more comprehensive understanding of how to adapt circular economy principles to different settings, further enhancing the sustainability of rural eco-tourism initiatives.

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