

Socio-Behavioural Barriers and Policy Gaps in Implementing Circular Economy Models in Coastal Tourism: A Qualitative Study in the Kalutara District, Sri Lanka

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1. Introduction

Global tourism has recovered rapidly following the COVID-19 pandemic, and international arrivals have returned to pre-pandemic levels in many regions, placing renewed pressure on local environments and resource systems in popular destinations. Tourism generates diverse waste streams (solid waste, food waste, plastics) and increases demands on water, energy, and sanitation infrastructure, making the sector both a contributor to environmental degradation and an important target for sustainable interventions. Recent assessments emphasize that sustainable tourism practices, particularly those that reduce waste and keep materials in productive use are essential for aligning tourism with climate and circularity goals.

The circular economy (CE) offers process-oriented strategies (reduce, reuse, recycle, remanufacture, valorize) that can reduce resource throughput and environmental impacts of tourism value chains while creating local economic opportunities. In the Sri Lankan context, several studies and policy documents have advanced CE concepts across sectors and highlighted the potential for circular business models in tourism small and medium enterprises (SMEs). However, implementation remains uneven: technical solutions exist, but social, institutional and market barriers constrain adoption in practice. Recent Sri Lankan studies document a range of implementation barriers including limited stakeholder awareness, inadequate incentives, weak value-chain linkages, financing constraints, and regulatory gaps across sectors such as construction, apparel and municipal waste management. These cross-sectoral findings suggest that technical feasibility alone is insufficient and that socio-behavioral and governance factors play a critical role in uptake.

Coastal tourism areas are uniquely vulnerable because they concentrate visitor fluxes, hospitality enterprises, and fragile coastal ecosystems within constrained local infrastructure. Kalutara District, part of Sri Lanka's high-density southwest tourism belt that includes Kalutara

town, Wadduwa, Beruwala and adjacent coastal communities faces persistent challenges in solid-waste disposal, coastal erosion, and pollution of inland waterways, all of which are exacerbated by tourism seasonality and informal waste practices. Local planning documents and environmental profiles identify municipal waste management, tourism-related litter, and gaps in decentralized waste services as priority issues for the district's sustainable development. These contextual factors make Kalutara a strategically relevant study area for investigating circularity interventions within tourism systems.

Despite growing policy attention (for example, Sri Lanka's National Action Plan on Plastic Waste Management 2021–2030 and national circular economy analyses), there is a notable shortage of empirical social-science research that explicitly examines the socio-behavioral drivers of, and institutional obstacles to, circular economy adoption in tourism locales. Reported research on tourism in Sri Lanka tends to quantify waste streams or evaluate hotel environmental management practices, whereas fewer studies explore community perceptions, stakeholder cooperation, or enforcement dynamics that determine whether circular practices are adopted and sustained at scale. In short, the literature shows a technical and policy foundation for CE in Sri Lanka but leaves a gap in understanding how human behavior, local governance, and market arrangements interact to enable or block circular processes in tourism contexts.

Therefore, this study addresses the following research problem: why are circular economy practices not widely implemented and sustained among tourism actors in coastal Sri Lanka, despite policy guidance and demonstrated technical options? Focusing on Kalutara District, the study investigates socio-behavioral barriers (knowledge, attitudes, practices, social norms), institutional and policy gaps (regulatory enforcement, incentives, public-private coordination), and value-chain constraints (market demand for recycled/repurposed materials, logistics and economies of scale) that inhibit circular transitions in the tourism sector. The objective is

to generate actionable insights that link social drivers with process-level interventions enabling engineering and policy actors to design socially viable circular strategies tailored to coastal tourism systems.

The contribution of this research is twofold. First, it brings a socio-behavioral and governance lens to a primarily technical conversation on waste valorization and sustainable process technologies, responding to the conference's call for interdisciplinary approaches that advance greener horizons. Second, by situating the analysis in Kalutara, a representative coastal tourism district with documented environmental pressures and planning initiatives the study produces contextually grounded evidence that can inform local policy, tourism management, and engineering design choices (e.g., decentralized recycling hubs, business model incentives for hotels, and community engagement protocols). The next sections describe the study's objectives, methodological approach, and the anticipated implications for circular process innovations in tourism.

2. Experimental Section

2.1 Materials

This study did not involve the use of laboratory chemicals, reagents, or physical experimental compounds. Instead, the research employed qualitative social-research tools and documentary materials relevant to circular-economy process implementation in tourism settings. The materials and data sources used in this study included the following:

- **Primary Data Materials:** Interview Protocols, Audio Recording Tools, Field notebooks.
- **Secondary Data Materials:** Policy and Regulatory Documents (e.g., National Action Plan on Plastic Waste Management (Sri Lanka), Academic Literature and Technical Reports, Municipal Solid-Waste System Data
- **Sampling Materials:** Purposive Sampling Framework targeting Hotel managers, Local authority officials, Community leaders, and Tourism-related SMEs.

No chemical laboratory materials were used in this study, as the focus was on socio-behavioral, institutional, and process-system dynamics related to circular economy adoption in coastal tourism settings.

2.2 Methods

This study followed a qualitative case-study approach to examine the socio-behavioral, institutional, and policy-level barriers influencing circular-economy adoption in coastal tourism settings in the Kalutara District of Sri Lanka. The methodology was designed to ensure contextual depth, triangulation of data sources, and replicability.

2.2.1 Study Design and Area

A single-site qualitative case study approach was adopted to explore circular-economy practices in an operational tourism environment. The study was conducted in the Kalutara coastal tourism belt, including Kalutara town, Wadduwa, Beruwala, and adjacent coastal SME clusters.

2.2.2 Sampling Strategy Size and Participants

A purposive sampling approach was utilised to recruit participants directly involved in tourism services and waste-management activities. The sample size was determined based on qualitative research considerations and **thematic saturation**, rather than statistical generalization. The study targeted 40–50 participants distributed across four categories: Hotel/Resort managers, Tourism SMEs, Local authority officers, and Community stakeholders. The final participant distribution is detailed in Table 1.

Table 1. Projected Participant Categories and Corresponding Sample Counts.

Participant Category	Approx. Number
Hotel and resort managers	10–15
Tourism SMEs (guesthouses, restaurants, vendors)	10–15
Local authority and waste-management officers	5–10
Community stakeholders involved in waste handling	5–10

2.2.3 Data Collection and Ethical Considerations

Three data-collection techniques were employed: Semi-structured interviews (30–60 minutes each), Field observations, and Document review. All interviews were audio-recorded with informed consent. Ethical principles of voluntary participation, confidentiality, anonymity, and informed consent were followed.

2.3 Data Processing & Analysis

Given the qualitative nature of this study, data processing and analysis refers to systematic handling, coding, and interpretation of textual and observational data.

2.3.1 Data Preparation and Analytical Method

Audio recordings were transcribed verbatim. Field notes were compiled into structured observation sheets. Documents were scanned for relevant policy directives and CE initiatives. A thematic analysis was conducted following standard qualitative protocols: familiarisation, initial open coding, development of axial themes, and refinement into core categories. Coding was carried out using NVivo or equivalent software, supported by manual review for triangulation.

2.3.2 Reliability and Validity

Reliability and validity were ensured through triangulation across interviews, observations, and documents; maintenance of an audit trail of coding decisions; researcher reflexivity notes; and peer debriefing.

3. Results and Discussion

The findings of this study reveal multiple socio-behavioral, institutional, and policy-related barriers influencing circular economy adoption in coastal tourism settings in Kalutara District. Data were derived from semi-structured interviews (n = 45), field observations, and document reviews, and analyzed using thematic coding.

3.1 Socio-Behavioral Barriers

Analysis identified several behavioral and perceptual challenges, as summarized in Table 2. These findings are consistent with studies from Sri Lanka and South Asia, where awareness.

3.2 Institutional and Policy Gaps

Institutional and regulatory issues, also reflected in Table 2, emerged as key obstacles: weak regulatory enforcement, limited collaboration (Coordination Gaps) between local authorities, SMEs, and community groups, and the absence of financial or technical incentives (Incentive Deficiency) to reduce stakeholder motivation for adopting circular practices. These results align with prior work highlighting the importance of governance structures and incentive mechanisms in promoting circular economy adoption (SLTDA, 2021; UNEP, 2022).

Table 2: Summary of Key Socio-Behavioral and Institutional Barriers

Theme	Description	Representative Quotes
Limited Awareness	Minimal understanding of CE concepts and practices	“We recycle some plastics, but we do not know about broader CE models.” – Hotel Manager
Resistance to Change	Perceived cost and effort of new practices	“It is easier to continue with current practices than invest in new systems.” – SME Owner
Regulatory Gaps	Weak monitoring and enforcement	“We rarely face penalties even if we mismanage waste.” – Local Authority Officer
Coordination Deficiency	Lack of collaboration across stakeholders	“Tourism operators and the council rarely communicate on recycling initiatives.” - SME Owner

3.3 Infrastructure and Process Constraints

Field observations revealed practical limitations:

- Lack of decentralized recycling facilities near tourism clusters.
- Insufficient collection, segregation, and storage practices.

- Limited access to markets for recycled or repurposed materials.

These constraints illustrate that technical feasibility alone is insufficient; process infrastructure must be aligned with behavioral and policy interventions to achieve effective circularity.

3.4 Integrated Findings

A conceptual framework summarizing the barriers is presented in Figure 1.

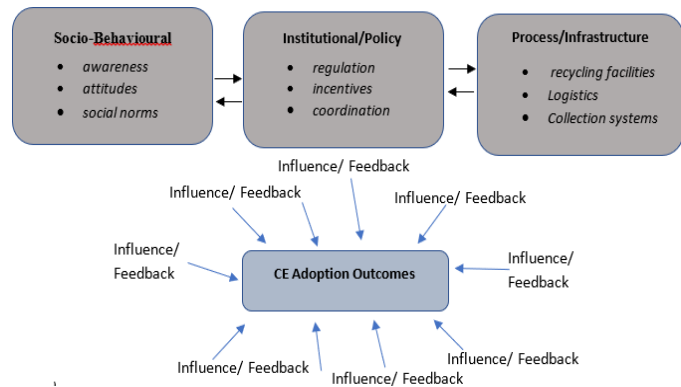


Figure 1. Conceptual framework of socio-behavioral and institutional barriers to circular economy adoption in Kalutara District tourism.

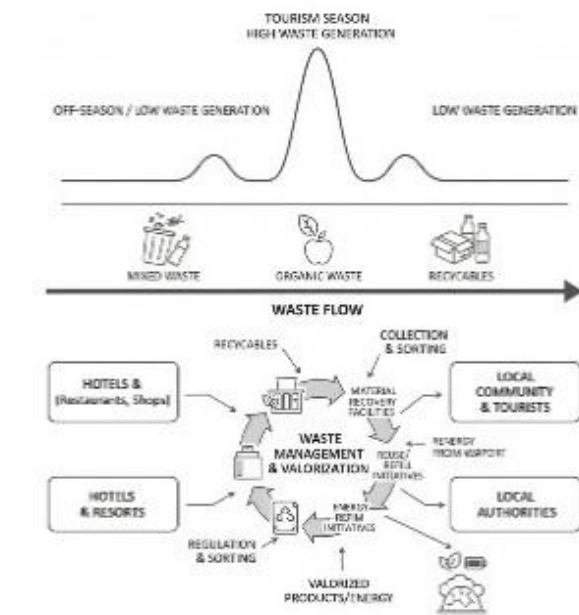


Figure 2. Seasonal waste flow and stakeholder interactions.

Figure 2 Demonstrates seasonal peaks in tourism waste and the roles of hotels, SMEs, community, and local authorities in managing and valorizing waste streams.

Table 03: Description of participant by sketch holder category

Participant Category	Sample Size	Location	Role in CE Adoption	Observed Challenges	Notes
Hotels/Resorts	12	Kalutara/Wadduwa	Implementation of CE practices	Lack of awareness, infrastructure gaps	Semi-structured interviews
Tourism SMEs	14	Beruwala	Small-scale recycling & reuse	Cost concerns, social norms	Semi-structured interviews
Local Authorities	8	Kalutara Municipal Council	Regulation & monitoring	Enforcement gaps, low incentives	Interviews & document review
Community Stakeholders	6	Coastal villages	Waste handling & collection	Resistance to formal systems	Observations & interviews

4 Discussion

The findings demonstrate that behavioral factors (knowledge, resistance, norms) are as critical as technical solutions in enabling circular economy adoption, confirming observations in similar studies (Nawarathna & Perera, 2024). Institutional gaps, including weak enforcement and limited coordination, exacerbate behavioral barriers and reduce practical uptake of CE initiatives. Practical infrastructure constraints (limited recycling hubs, poor logistics) hinder valuechain integration, highlighting the need for integrated socio-technical interventions. The study confirms the interdisciplinary nature of CE adoption, combining social, technical, and governance dimensions directly aligning with the conference’s theme of greener process innovations.

Qualitative Metric

For comparative analysis of adoption levels, an index can be used:

$$CE\ Adoption\ score = \frac{Objective\ Practicers}{Recommended\ Practices} \times 100$$

Variables: Observed Practices = number of CE practices implemented by a stakeholder, Recommended Practices = total CE practices expected per guidelines

5 Implications, Limitations, and Future Directions

Implications:

- Policy: Establish incentives, monitoring, and collaboration mechanisms for tourism operators.
- Practice: Develop decentralized recycling hubs and training programs to raise awareness.
- Research: Highlights the value of integrating social science perspectives in process-engineering solutions.

Limitations:

- Findings are specific to Kalutara District and may not generalize nationally.
- Sample size is modest and purposively selected, limiting statistical inference.

Future Directions:

- Comparative studies in other coastal tourism districts.
- Integration of digital tools (AI, IoT) for monitoring and improving circularity.
- Quantitative modeling of economic and environmental impacts of CE adoption in tourism.

6 Conclusions

Circular economy adoption in Kalutara coastal tourism is constrained by socio-behavioral, institutional, and infrastructure-related barriers. Awareness, attitudes, social norms, regulatory enforcement, coordination, and infrastructure collectively influence adoption. Integrating socialscience insights into technical and policy interventions is essential for sustainable tourism. Future work should extend comparative studies to other coastal districts and explore digital tools for monitoring CE adoption.

Declaration of Competing Interest

The authors declare no competing interests.

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