



Developing Regenerative Tourism Models in Coastal Villages: A Local Wisdom-Based Approach

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ABSTRACT

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This research investigates the integration of regenerative tourism principles with local wisdom in coastal tourism villages. It aims to (1) examine the integration of regenerative tourism and local cultural values, (2) develop a model grounded in local wisdom, and (3) recommend strategies for its implementation in coastal villages. Data were collected through observation, in-depth interviews, document analysis, and focus group discussions, with informants selected purposively, including village heads, tourism managers, leaders of village-owned enterprises, coral reef conservation communities, fishermen and salt farmers. A descriptive qualitative approach was used for data analysis. It applied Interpretive Structural Modeling (ISM) to formulate the model and strategies that were input from nine experts, including Head of the Tourism Office, tourism village manager, and academics. The study results present integrating regenerative tourism principles with local wisdom in Bali's coastal tourism villages offers a viable pathway to sustainable tourism that balances ecological restoration, cultural preservation, and community well-being. The approach strengthens the adaptive capacity of tourism communities by leveraging social, cultural, and institutional capital, enabling them to respond effectively to environmental, developmental, and market challenges. The ISM-based hierarchical model developed in this study provides a practical and replicable framework for other tourism villages aiming to implement inclusive, adaptive, and long-term sustainable governance while ensuring equitable benefits for all residents.

1. INTRODUCTION

Tourism is a key driver of national revenue and regional development, particularly in rural and coastal areas. However, large-scale, exploitative tourism development frequently leads to significant adverse impacts, including ecosystem degradation, the erosion of local cultural values, and heightened socio-economic inequalities within host communities [1]. Coastal tourism villages, which typically possess rich biological and cultural resources, are especially vulnerable to these impacts when management deviates from sustainability principles.

In response to these challenges, the concept of regenerative tourism has emerged as a progressive alternative to conventional sustainability models. Moving beyond mere maintenance, this approach seeks actively to restore and enhance ecosystem quality and community well-being [2]. It emphasises the necessity of active community participation in creating holistic, context-sensitive tourism value. Consequently, tourism is reconceptualised as a transformative force that revitalises living systems, positioning local

communities as the primary agents of change [3, 4].

Regenerative tourism is fundamentally aligned with local wisdom, as both philosophies position humans as an integral part of nature and emphasise harmony between economic, social, and ecological systems. This synergy is rooted in traditional ecological knowledge, which, as noted by Berkes et al. [5], constitutes a critical component of socio-ecological systems capable of sustainable resource management. Local wisdom which comprises inherited knowledge, values, and practices demonstrates superior adaptability and sustainability in responding to environmental change [6]. In coastal villages, it is central to shaping cultural identity, maintaining ecological balance, and governing human–nature relationships. Practices such as sustainable fishing, customary marine conservation, and sea-related cultural rituals provide a vital foundation for developing a contextual and inclusive regenerative tourism model.

Local wisdom also acts as a mechanism of resistance against cultural homogenization brought about by tourism globalization. The integration of local culture within a regenerative tourism framework becomes a tool for

environmental restoration and a means to preserve identity and strengthen community capacities [7, 8]. Thus, integrating regenerative principles with local wisdom enables the creation of tourism models that are not only sustainable but also socially and culturally equitable, serving as a strategic pathway toward community and culture based ecological regeneration [9]. The active involvement of local communities from planning to implementation stages is essential to ensure that tourism policies and practices align with social norms and structures, while also reinforcing their position as primary stewards of tourism resources [10]. Regenerative principles such as place-based approaches, community co-creation, and ecological restoration resonate strongly with local wisdom values emphasizing harmony with nature, social responsibility, and sustainable cultural heritage [11].

Beyond preserving cultural heritage, applying regenerative principles aligned with local wisdom creates opportunities for transformative tourism. This model transforms tourists from passive consumers into active participants in ecological and social restoration. As highlighted by Pollock [12], regenerative tourism grounded in local values achieves more significant long-term impacts than conventional approaches by fostering reciprocal relationships between visitors, host communities, and natural environments. Consequently, this integration advance beyond a theoretical concept to become an operational framework guiding policy and practice in Indonesian coastal tourism villages.

Sustainable tourism development in Bali confronts serious challenges, including marine ecosystem degradation from waste pollution and coastal reclamation [13], alongside the erosion of local culture through the commercialisation of traditional ceremonies and architecture [14]. Despite these pressures, Bali's coastal tourism villages possess distinct ecological and socio-cultural characteristics that offer substantial potential for community-based regenerative development. For instance, Les Tourism Village in Buleleng Regency engages its community in marine preservation and is renowned for coral reef conservation using biorock methods. Its cultural appeal is further strengthened by the *nyegara gunung* philosophy, which integrates coastal landscapes.

Similarly, Pemuteran Tourism Village, also in Buleleng, pioneered community-based coral reef restoration in the late 1990s. It has successfully established a collaborative model involving indigenous communities, tourism businesses, and non-governmental organisations, becoming a benchmark for sustainable marine ecotourism. In contrast, Serangan Tourism Village in Denpasar City holds historical and spiritual significance due to Sakenan Temple and an assimilated Bugis fishing community. While it promotes turtle and mangrove conservation-based ecotourism, it continues to face challenges from spatial governance pressures and commercialisation. Collectively, these three villages demonstrate diverse local practices with the potential to form regenerative tourism models. Grounded in local wisdom, such models actively restore ecosystems and reinforce coastal cultural identity.

Previous studies on regenerative tourism, while extensive, have predominantly emphasised the values of *Tri Hita Karana* and *subak* as cultural practices [15], neglecting the specific local wisdom of coastal communities. Furthermore, prevailing management strategies remain sectoral, addressing cultural, environmental, and economic aspects in isolation [16, 17], and lack a holistic model that integrates these dimensions within coastal tourism villages. Although Bellato and Pollock [18] developed a regenerative tourism framework from systems

theory, its direct application to coastal villages rooted in Southeast Asian customary systems remains absent. Similarly, while Cave and Dredge [19] stressed the cultural significance of restoring community values, their work provided limited exploration into how to systematically integrate coastal local wisdom. This aligns with Prayag [20], who highlighted a scarcity of regenerative tourism research in developing nations with rich cultural-ecological assets, revealing a specific empirical gap in the context of Indonesian coastal villages. Hussain and Haley [21] examined the challenge of translating regenerative concepts from natural science to tourism, yet their conceptual, global-scale analysis lacked deep engagement with specific regional contexts. Finally, Duxbury et al. [22] advanced creative tourism models within regeneration frameworks without thoroughly exploring how local values contribute to its foundational principles.

Despite longstanding efforts to promote sustainable tourism in Bali, implementation remains largely conventional and has consequently failed to adequately address escalating challenges such as ecosystem degradation and the erosion of coastal cultural identity. This situation highlights the urgent need for regenerative tourism approaches that centred on environmental restoration, reinforcing local wisdom, and empowering youth engagement and fundamentally anchored in the specific values of coastal communities. Such place-based strategies are important for building socio-ecological resilience and catalysing a transformative paradigm shift which turn tourism from a resource-extractive industry into a mutually beneficial platform for shared learning and ecological stewardship [3, 23].

This study addresses these critical gaps by establishing three sequential objectives. First, it seeks to identify the key components for integrating regenerative tourism with the local wisdom of coastal communities. Second, it constructs a validated hierarchical model using Interpretive Structural Modeling (ISM) to map the interrelationships among these elements. Third, it formulates practical, prioritised implementation strategies for coastal villages derived directly from the model.

While an integrated approach holds immense promise for establishing sustainable and equitable tourism governance, in-depth empirical research on regenerative tourism grounded in local wisdom remains scarce, particularly in Indonesian coastal regions. Consequently, developing this operational model provides a strategic pathway for conserving environmental and cultural heritage while simultaneously enhancing the adaptive capacity and well-being of coastal communities.

This study addresses identified research gaps by making a significant and novel contribution to the literature on sustainable tourism and regional governance. First, it pioneers a systematic integration of regenerative tourism principles with the applied tenets of coastal local wisdom, advancing beyond descriptive approaches through rigorous qualitative and interpretive structural analysis. Second, utilising ISM, it develops a novel hierarchical framework that delineates the key driving and dependent factors of regenerative governance. This model provides policymakers with a clear, prioritised pathway for strategic intervention. Finally, the study translates broad regenerative theories into a practical, empirically-grounded governance framework tailored to Indonesian coastal villages, thereby filling a critical empirical gap for developing nations by anchoring global concepts in specific local customary practice.

2. METHODOLOGY

This study employed a qualitative approach to develop an in-depth understanding of regenerative tourism practices and to formulate a locally grounded model and strategy for coastal villages in Bali. This methodology was selected for its capacity to provide a holistic understanding of the social, cultural, and environmental contexts shaping these dynamics [24].

The research was conducted in three purposively selected coastal tourism villages in Bali including Les, Pemuteran, and Serangan which selected for their implementation of, or demonstrable potential for, regenerative practices. Site selection criteria included the presence of local wisdom in tourism management, the degree of community engagement, and a commitment to environmental and cultural sustainability.

Data collection integrated four techniques: observation, in-depth interviews, document analysis, and focus group discussions (FGDs). Direct observation enabled a first-hand examination of tourism practices and the contextual application of local wisdom. Seventeen key informants (N = 17), including village heads, tourism village managers, leaders of village-owned enterprises, coral reef conservation communities, turtle conservation group leader, fishing communities, salt farmers, and seaweed farmers were selected via purposive sampling. Semi-structured interviews, lasting 45–90 minutes, captured their perceptions, experiences, and management strategies. The profiles and specific expertise of key informants are presented in Table 1.

Data analysis followed a descriptive qualitative framework

involving data reduction, display, and conclusion drawing/verification [25]. Interview data were processed through thematic analysis to identify core elements related to local wisdom and regenerative principles; these elements subsequently served as inputs for the ISM phase. Document analysis supplemented this by exploring theoretical foundations and relevant concepts. Finally, FGDs were conducted to capture diverse stakeholder perspectives and to collaboratively formulate the regenerative tourism model.

This study employed ISM to formulate the development model and strategies. This systemic methodology identifies and structures relationships among key elements into a comprehensive hierarchy [26], making it particularly effective for delineating the key drivers of sustainable tourism development within specific local and cultural contexts.

The ISM process involved four stages: (1) identifying key elements; (2) constructing a Structural Self-Interaction Matrix (SSIM); (3) developing reachability matrices and establishing hierarchy levels; and (4) visualising the results in a definitive ISM diagram [27]. In this application, ISM was used to construct a regenerative tourism model for Balinese coastal villages. Data were gathered through a survey of nine experts, including the Head of the Tourism Office, village heads, tourism managers, and academics. The method enabled the systematic structuring of relationships between critical elements such as village regulations, community participation, coastal conservation, and tourist education into a coherent hierarchy. ISM was selected for its capacity to accommodate the complex interdependencies between social, economic, cultural, and environmental factors, which are often inadequately captured by purely quantitative approaches.

Table 1. Profiles and specific expertise of key informants

Informant Code	Role/ Position	Location	Specific Expertise/Focus
P-01	Village Head	Les Tourism Village	Institutional governance & village regulation
P-02	Tourism Village Manager	Les Tourism Village	Tourism product diversification & local supply chain development
P-03	Leaders of Village-Owned Enterprises	Les Tourism Village	Regenerative fund allocation & financial management
P-04	Coral Reef Conservation Communities	Les Tourism Village	Seabed maintenance practices & community-led coral cleaning initiatives
P-05	Fishing Communities	Les Tourism Village	Ecotourism transport provision & dive equipment logistics support
P-06	Salt Farmers	Les Tourism Village	Traditional, eco-friendly salt production methods & heritage preservation
P-07	Village Head	Pemuteran Tourism Village	Collaborative policy making & stakeholder consensus building
P-08	Tourism Village Manager	Pemuteran Tourism Village	Visitor management policy & carrying capacity edicts
P-09	Coral Reef Conservation Communities	Pemuteran Tourism Village	Biorock technology & community-based marine conservation
P-10	Fishing Communities	Pemuteran Tourism Village	Marine ecotourism guiding & Customary Marine Protected Areas monitoring
P-11	Salt Farmers	Pemuteran Tourism Village	Local salt production & community-based tourism product support
P-12	Village Head	Serangan Tourism Village	Inter-institutional collaboration & youth empowerment
P-13	Tourism Village Manager	Serangan Tourism Village	Regenerative welcome briefing & tourist education programs
P-14	Coral Reef Conservation Communities	Serangan Tourism Village	Technical coral grafting & seabed restoration maintenance
P-15	Turtle Conservation Group Leader	Serangan Tourism Village	Turtle conservation & community-based breeding program management
P-16	Fishing Communities	Serangan Tourism Village	Guiding tourists & assisting coral maintenance
P-17	Seaweed Farmers	Serangan Tourism Village	Sustainable cultivation methods & integration into local culinary tourism

The structural relationship among the eight identified elements was determined by an expert panel consensus. The interaction between any two elements (i and j) was classified using four symbols: V (element i leads to j), A (element j leads to i), X (elements i and j lead to each other/bidirectional), or O (no relationship). To ensure methodological rigor, we present a specific example of the relationship encoding based on the expert panel's consensus (as shown in the SSIM).

- a. Relationship between element A and element E (X): the matrix shows an 'X' relationship. This indicates a bidirectional influence, meaning the expert panel agreed that element A (active involvement of local villagers) influences element E (community-based coastal ecosystem conservation), and element E also influences element A. Both factors mutually reinforce each other.
- b. Relationship between element E and element F (V): the matrix shows a 'V' relationship. This signifies a unidirectional influence where element E (community-based coastal ecosystem conservation) leads to element F (diversification of eco-cultural tourism products), but F does not directly drive E. This consensus suggests that conservation is a prerequisite for product diversification.
- c. Relationship between element A and element C (O): the matrix shows an 'O' relationship. This means the expert panel determined there is no direct linkage or significant influence between element A (active involvement of local villagers) and element C (preservation of coastal culture and traditions), implying their interaction is mediated by other factors in the model.

This resulting Structural Self-Interaction Matrix (SSIM) was then converted into the final Reachability Matrix by applying transitive logic. The consensus validation process confirmed that the final model accurately reflects the hierarchical relationships agreed upon by the expert panel.

3. RESULTS AND DISCUSSION

Integrating regenerative tourism principles with the local wisdom of Bali's coastal villages represents a strategic shift towards a holistic sustainable tourism paradigm. This approach moves beyond minimising negative impacts to actively generating positive contributions for both ecosystems and local communities. Its implementation in coastal areas necessitates embedding the cultural values, traditional knowledge, and enduring sustainable practises inherent to these communities. This study examines this integration through three case studies including Les and Pemuteran in Buleleng Regency, and Serangan in Denpasar which have cultivated local wisdom-based practises with significant potential for a regenerative tourism framework.

3.1 Integration of regenerative tourism and local wisdom in Coastal Tourism Villages

3.1.1 Les Tourism Village

Les Tourism Village distinguishes itself through its integration of local wisdom with regenerative tourism principles. The community actively addresses environmental challenges via community-driven coral reef restoration and water conservation programmes. Residents employ eco-

friendly technologies, transforming tourist visits from passive observation into active contribution through participation in coral planting. This commitment to proactive restoration [28] is rooted in the traditional *subak laut* coastal management system, which emphasises communal cooperation among fishers to prioritise sustainability over resource extraction.

Local fishermen have adopted sustainable techniques, abandoning harmful methods like cyanide fishing in favour of reef-friendly practices. Generational traditional ecological knowledge covering fishing seasons, designated non-destructive zones, and selective harvesting is now incorporated into educational tourism. Visitors are allowed to join fishing trips to learn these methods and hear oral histories of the sea directly from community members (Interview with Fishermen Community).

The *Nyegara Gunung* philosophy, which articulates a reciprocal relationship between the sea and mountains, provides an ecological framework for maintaining environmental balance. This cosmological concept treats the sea and mountain as interconnected ecosystems. According to the Village Head, its implementation was pivotal in Les being awarded Indonesia's Best Tourism Village in 2024. Practically, this philosophy manifests in integrated land management: maintaining riparian vegetation, minimising household waste, and enforcing customary prohibitions on destructive activities. This approach also educates tourists on the critical land-sea conservation linkages for coastal sustainability.

Furthermore, Les is renowned for its traditional *palungan* salt production, an intangible cultural heritage. This method uses coconut logs as evaporation channels for seawater, yielding high-quality salt without chemical additives. Interviews with salt farmers confirm the process begins with manual seawater collection during favourable tides to minimise habitat disturbance. After natural solar evaporation in the logs, the water is filtered and crystallised in sandy pans. The salt is typically packaged in eco-friendly materials like bamboo or cloth, though some modern packaging is now used for market expansion. As noted by Widari and Prasiasa [29], this practice preserves the salt's distinctive taste and serves as an educational tourism attraction, allowing visitor participation while enhancing the local economy and conveying its ecological and cultural significance.

3.1.2 Pemuteran Tourism Village

Pemuteran has gained international recognition for its pioneering Biorock coral reef restoration project, which successfully integrates marine science with community-led action. Initiated to counteract destructive fishing practices, the community employs this solar-powered technology both as a conservation tool and a core educational tourism attraction. Tourists engage directly in coral planting, fostering a sense of ecosystem stewardship (Interview with Coral Reef Community). This commitment is further evidenced by local fishers who enforce self-regulated restrictions on destructive gear to ensure marine sustainability (Interview with Fisherfolk Community and Village Head), forming a robust, community-led governance model that underpins the village's ecotourism success.

Culturally, Pemuteran sustains its spiritual connection to the sea through rituals such as *Melasti*, a purification ceremony held before *Nyepi* (the Balinese Day of Silence). During *Melasti*, sacred artefacts (*Pratima*) are carried to the sea to be cleansed, affirming the ocean's role as a source of spiritual, not

just physical, sustenance. This ritual reinforces ecological ethics and provides a moral foundation for conservation, creating a powerful synergy with the Biorock project. The technological initiative thus complements the community's belief in the ocean as a sacred realm to be protected. Collectively, Biorock and *Melasti* embody the symbiotic relationship between technological innovation and local wisdom that defines community-based regenerative tourism [7].

Pemuteran further enhances its profile through the annual Pemuteran Bay Festival, held between November and December. This event functions as a strategic platform that blends cultural celebration with conservation, driving local economic activity while promoting coral reef preservation. The festival's integrated programmes include: (1) marine conservation initiatives, such as Biorock coral planting and beach clean-ups involving residents, students, and tourists; (2) cultural showcases featuring traditional Balinese dance, ethnic music, craft exhibitions, and ritual ceremonies like the *Melasti* opening; (3) marine sports competitions, including bay swimming, stand-up paddle races, and traditional boat regattas; and (4) a local market and culinary fair showcasing seafood, regional dishes, and MSME products.

3.1.3 Serangan Tourism Village

Serangan Tourism Village is distinguished as one of Bali's primary turtle conservation centres, representing a significant shift in community values from historic consumption to contemporary preservation. This transformation is formally governed by *awig-awig* (customary law) and guided by the *Tri Hita Karana* philosophy, structuring a conservation programme that integrates egg incubation, hatchling release, and marine ecosystem education (Interview with Turtle Conservation Community and Tourism Village Manager). This model exemplifies tourism governance deeply rooted in spiritual and customary principles.

The village's holistic approach extends to its mangrove forests, which function as a natural coastal buffer. Their rehabilitation has been developed into a form of educational tourism, actively involving visitors. The legitimacy of these and other initiatives is reinforced by *awig-awig* and social custom. This community empowerment is crucial, demonstrating how local actors can effectively balance economic and ecological benefits [30]. The legacy of sustainable seaweed farming, though no longer a primary livelihood, further reflects the community's historical commitment to harmonious coastal resource use.

Annually, the *Mimintar* purification ritual symbolises the community's spiritual dedication to environmental and social harmony. Within the regenerative tourism framework, it is preserved as a sacred ceremony rather than staged as a tourist spectacle. Nevertheless, it has become a significant cultural attraction, with managed visitor observation and education to foster respect for its sanctity and meaning.

Furthermore, the annual Serangan Festival "*Pesona Pulau Serangan*" integrates local wisdom into an inclusive tourism platform designed to strengthen cultural identity. As interviews confirm, the festival is structured around three core pillars - the "3Es": Economy which presents a marketplace for local MSMEs, featuring seafood, handicrafts, and traditional cuisine; Education which shows cultural performances and workshops on coastal conservation; and Ecology that promotes environmental campaigns including turtle hatchling

releases and mangrove planting. The festival demonstrates how tourism possibly successfully coexists with and actively support cultural and ecological preservation, fostering a collective awareness among both residents and visitors.

The integration of local wisdom into regenerative tourism across Les, Pemuteran, and Serangan is operationalised through three strategic approaches: (1) enhancing visitor education via immersive learning journeys, including salt-making workshops, conservation snorkelling, and participation in traditional rituals; (2) empowering the local economy by developing value-added products such as organic salt, crafts, and paid conservation tours; and (3) advancing community-based ecosystem conservation by actively engaging tourists in rehabilitation activities like coral planting, turtle hatchling releases, and maintaining no-take zones.

This tripartite strategy aligns with the findings of the study by Anantharaman et al. [31], who highlight that regenerative tourism necessitates close collaboration between local stakeholders, destination managers, and visitors to generate constructive impacts that extend beyond mere harm reduction. Through these mechanisms, the integration strengthens the communities' adaptive capacity to respond to climate change, developmental pressures, and market fluctuations. This nonresponses with the resilience framework proposed by Lew [32], which asserts that long-term sustainability is contingent upon local communities maintaining control over the transformation processes within their territories.

3.2 Regenerative tourism models based on local wisdom in Coastal Tourism Villages

Based on field observations, interviews, and data analysis, this study identifies eight key elements in formulating a regenerative tourism model grounded in local wisdom for coastal tourism villages:

- A. Active involvement of local villagers (*krama desa*)
- B. Strengthening of customary and tourism village institutions
- C. Preservation of coastal culture and traditions
- D. Tourist education on local values
- E. Community-based coastal ecosystem conservation
- F. Diversification of eco-cultural tourism products
- G. Strengthening regenerative local economy
- H. Collaborative regulations administrative and customary villages

These key elements were incorporated into an expert survey questionnaire and analyzed using ISM. Data analysis involved the development of a Structural Self-Interaction Matrix (SSIM) based on the responses of nine experts (see Table 2).

Based on the results of the Structural Self-Interaction Matrix (SSIM), a reachability matrix was developed to illustrate the complete and comprehensive structural relationships among the elements of regenerative tourism based on local wisdom in coastal tourism villages, as presented in Table 3.

In the reachability matrix, the elements with the highest driver power (7) are element B (strengthening the institutions of customary villages and tourism villages) and element H (collaborative regulations between the administrative and customary villages). The elements with the lowest driver power (1) are element C (preservation of coastal culture and traditions), element D (tourist education on local values), and element G (strengthening the regenerative local economy). The element with the highest dependence (7) is element G

(strengthening the regenerative local economy), while the element with the lowest dependence (1) is element C (preservation of coastal culture and traditions). Based on the reachability matrix, a MICMAC diagram was constructed to classify the system elements according to their driving power and dependence, as illustrated in Figure 1.

Table 2. Structural Self-Interaction Matrix (SSIM)

	A	B	C	D	E	F	G	H
A	A	O	V	X	V	V	A	
B		O	V	V	V	V	X	
C			O	O	O	O	O	
D				A	O	O	A	
E					V	V	A	
F						V	A	
G							A	
H								

Table 3. Final Reachability Matrix

	A	B	C	D	E	F	G	H	Drv.
A	1	0	0	1	1	1	1	0	5
B	1	1	0	1	1	1	1	1	7
C	0	0	1	0	0	0	0	0	1
D	0	0	0	1	0	0	0	0	1
E	1	0	0	1	1	1	1	0	5
F	0	0	0	0	0	1	1	0	2
G	0	0	0	0	0	0	1	0	1
H	1	1	0	1	1	1	1	1	7
Dep.	4	2	1	5	4	6	7	2	

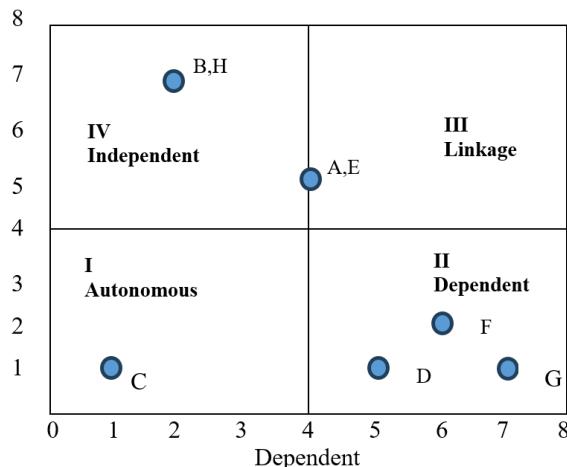


Figure 1. MICMAC diagram

The MICMAC analysis (Figure 1) highlights a systemic asymmetry in the distribution of driver power and dependence among key elements of regenerative tourism based on local wisdom in coastal tourism villages. Elements B (institutional strengthening of customary and tourism villages) and H (collaborative regulations between administrative and customary villages), located in Quadrant IV: Independent, emerged as the primary leverage points, indicating their critical role in driving systemic transformation. Their strong driver power and low dependence suggest that interventions in these elements can trigger cascading effects across the system with minimal vulnerability to external influence.

Conversely, elements A (active involvement of local villagers) and E (Community-based coastal ecosystem conservation), classified under Quadrant III: Linkage, demonstrate both high driver power and high dependence,

positioning them as dynamic yet volatile nodes within the system. Their dual nature implies that they both shape and are shaped by other elements, making them pivotal for maintaining systemic equilibrium but also susceptible to disruption.

Elements D (tourist education on local values), F (diversification of eco-cultural tourism products), and G (strengthening the regenerative local economy), situated in Quadrant II: Dependence, exhibit high dependence but low driving capacity, indicating their role as consequential outcomes rather than primary enablers of change. Notably, element G, despite its classification here, also recorded the highest dependence score, reinforcing its sensitivity to upstream interventions.

Finally, element C (preservation of coastal culture and traditions), positioned in Quadrant I: Autonomous, remains relatively inert with minimal influence on or from other elements. While its stability may ensure cultural continuity, its low systemic leverage indicates that it operates largely outside the core dynamics of the system. This positioning suggests that cultural preservation alone cannot serve as a catalyst for regenerative tourism unless it is strategically aligned and integrated with more dynamic and interdependent drivers within the system. Referring to the dependence–driver power diagram, the structural model of regenerative tourism based on local wisdom in coastal tourism villages is presented in Figure 2.

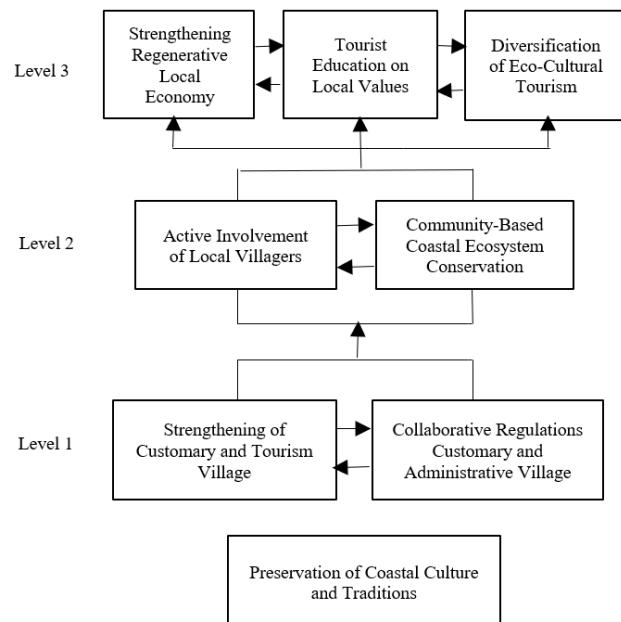


Figure 2. The hierarchical digraph structure of ISM model

This model identifies and categorizes key elements based on their roles and influence within regenerative tourism practices grounded in local wisdom in coastal tourism villages. The interrelationship among these elements can be conceptualized as a hierarchical structure, ranging from foundational drivers to ultimate outcomes. At the foundation of this hierarchy lie the strengthening of customary and tourism village institutions (B) and the establishment of collaborative regulations between customary and administrative villages (H). These elements function as primary drivers that provide the rules, structures, and strategic direction for all tourism-related activities. Institutional strengthening serves as the core governance framework,

responsible for decision-making, mediation, and rule enforcement, while embedding local norms and values as the foundation of tourism. Collaborative regulations act as formal “rules of the game,” co-created by customary institutions, administrative authorities, and relevant stakeholders to govern land use, environmental protection, and ethical interactions with visitors. Together, these elements exert direct influence on coastal ecosystem conservation and lay the groundwork for active community participation. Their relatively low dependence on other factors positions them as priority leverage points whose absence would leave the system fragmented and unsustainable. This is consistent with prior research [18, 33], which highlights the pivotal role of local governance and community-based institutions in strengthening community-driven tourism.

The second tier of the hierarchy comprises active involvement of local villagers (A) and community-based coastal ecosystem conservation (E), which are shaped by the institutional and regulatory foundations yet act as the primary operational drivers for higher-level outcomes. These elements are highly dynamic: they wield substantial influence over the system while being strongly shaped by upstream drivers. Active community involvement functions as both executor and change agent, facilitated by institutional and regulatory mandates, and directly affects ecosystem conservation, tourist education, and the strengthening of the regenerative local economy. Community participation in conservation and ecotourism projects has been shown to enhance socio-ecological resilience [34]. Likewise, coastal ecosystem conservation serves as a core asset and tourism attraction, influenced by regulatory frameworks and community engagement, while directly supporting product diversification and providing the basis for visitor education initiatives.

At the apex of the hierarchy are the elements representing the outcomes of the system: regenerative local economic strengthening (G), tourist education on local values (D), and diversification of eco-cultural tourism products (F). These elements are highly dependent on the effectiveness of the preceding tiers and lack sufficient driving power on their own. Tourist education is shaped by community participation and conservation practices that supply educational content and experiences aimed at fostering visitor awareness and ethical behavior. Product diversification is influenced by conservation efforts that provide resources and by community participation that drives innovation. The strengthening of the regenerative local economy relies heavily on diversified products as income sources and on active participation to ensure equitable benefit distribution.

Preservation of coastal culture and traditions (C), although representing the most stable foundation, exerts only limited systemic influence and shows minimal dependence on other elements. Positioned as an autonomous element, it functions more as a supporting backdrop rather than an active driver within the tourism system. This positioning reflects its role as an inherent part of the social and cultural fabric, maintaining continuity and identity but exerting marginal leverage on systemic transformation. Nevertheless, cultural preservation remains an essential pillar of coastal tourism, providing both authenticity and a sense of place, which are crucial for destination branding, product diversification, and visitor education. Its autonomous nature suggests that, while it may not initiate regenerative processes independently, it serves as a critical enabler when strategically aligned with more dynamic drivers such as community engagement, sustainable

resource management, and innovative tourism programming. Tourism villages that preserve traditional cultural practices offer an authentic tourist appeal without compromising their social values [35]. However, this element requires careful safeguarding to prevent erosion caused by external pressures, such as commercialization and modernization.

The hierarchical structure revealed by the ISM analysis provides a critical lens for engaging established regenerative tourism theory. The identification of Institutional Strengthening (B) and Collaborative Regulations (H) as fundamental drivers strongly validates the systems-thinking approach of Mang and Haggard [11], which posits that regeneration requires optimising overall socio-ecological health rather than minimising isolated impacts. This model demonstrates that, in this context, systemic health is first secured through robust governance (B and H).

Furthermore, the ISM results extend transformative governance frameworks such as Gibbons' [36]. While Gibbons [36] emphasised general mechanisms, this study highlights the unique role of the Autonomous element (C - Preservation of coastal culture and traditions). The stability of Element C, an indispensable though non-leveraged asset, positions local wisdom as a vital cultural precondition for the success of drivers B and H. This indicates that regenerative governance in such contexts must actively harness this deeply embedded local capital, adding a crucial contextual layer to broader models.

Beyond foundational theories, these findings offer a critical counterpoint to recent discourse. The strategic role of local institutions and regulations echoes Duxbury et al. [22]'s emphasis on adaptive, place-based governance for a regenerative transition. This study operationalises that concept, showing that in Bali, 'adaptive' specifically denotes the capacity to integrate customary law (*awig-awig*) with modern administration. Most significantly, the system's reliance on cultural preservation (C) as an immovable foundation substantiates Bellato et al. [3]'s concept of Regenerative Place-Shaping. While Bellato et al. [3]'s framework prioritises restoring human-place relationships, this model suggests that local identity is not merely an outcome but a non-negotiable input—a cultural anchor that provides the philosophical and ethical boundaries essential for governance drivers (B and H) to facilitate genuine regeneration, not merely economic growth.

Within the regenerative tourism framework proposed by Gibbons [36], tourism serves to restore the connections between people, place, and values. This is exemplified by the villages of Les, Pemuteran, and Serangan, where local philosophies such as *Tri Hita Karana*, communal reciprocity, and nature-based spirituality are fundamentally integrated. The theory emphasises a shift from consumptive to transformative tourism, moving beyond mere sustainability towards active regeneration. The practices observed demonstrate that this integration centres on the synergy between ecological innovation, cultural resilience, and institutional strengthening. Consequently, the model provides a replicable framework for other Indonesian coastal villages, advancing a more ethical, equitable, and sustainable tourism agenda.

3.3 Strategies for Implementing Regenerative Tourism based on local wisdom in coastal tourism villages

ISM analysis established a hierarchy of key factors for

implementing local wisdom-based regenerative tourism in coastal villages. Guided by this structure, an integrated strategy was developed to function synergistically from foundational elements towards long-term impacts.

3.3.1 Strengthening cultural foundations

The preservation of cultural heritage and traditions forms a stable, low-influence foundation in the initial stages. The primary objective is to protect this heritage without altering its essence. This can be achieved by establishing regular forums involving customary leaders, youth, and community members to develop innovative safeguarding approaches. Furthermore, documentation programmes should systematically record folklore, ceremonies, and artisanal skills to ensure their continuity. This participatory method aligns with Community-Based Tourism (CBT) principles, enhancing local ownership [37] and maintaining authenticity [38].

Two specific policy frameworks are critical to implement this strategy. First, Village Regulations should formalise a Cultural Heritage Protection Mandate, legally designating specific crafts (e.g., salt-making, boat building) and rituals as Intangible Village Assets to prevent unauthorised commodification. Second, a Cultural Subsidy and Incentive Policy must be established, directing a defined percentage of village-owned enterprise revenue towards grants for customary institutions and youth groups. This ensures the financial sustainability of cultural preservation by embedding it directly within the tourism economy.

3.3.2 Formulation and enforcement of collaborative regulations

The formulation and enforcement of collaboratively developed regulations form a cornerstone of regenerative tourism governance. This process requires: stakeholder mapping to identify key actors (e.g., customary villages, government, businesses, NGOs, and academia); conducting cross-sector Focus Group Discussions (FGDs) to establish rules for carrying capacity, zoning, waste management, and visitor conduct; formalising agreements through village regulations or *awig-awig*; and implementing community-based monitoring with phased sanctions. As Hall et al. [39] highlighted, collaborative governance enhances policy legitimacy and compliance, while Reed et al. [40] demonstrated that integrating traditional ecological knowledge leads to more effective and sustainable conservation. Cross-stakeholder FGDs also serve to mitigate potential conflicts between commercial, cultural, and developmental priorities.

Specific policy frameworks should include the mandatory collaborative development of a carrying capacity decree and the establishment of a joint enforcement task force. This task force, comprising administrative officers and customary security (*Pecalang*), would ensure compliance with regulations in sensitive areas like marine protected zones. Critically, the phased sanction system must integrate traditional fines or restorative justice practices with formal administrative penalties, creating an enforcement mechanism with both legal legitimacy and cultural resonance.

3.3.3 Strengthening customary and tourism village institutions

Robust institutional structures are essential for ensuring destination resilience. This strategy encompasses: capacity-building programmes in destination management including planning, promotion, and financial management for village

officials and tourism awareness groups (*Pokdarwis*); establishing joint business units for ticketing, guiding, and souvenir sales; and implementing equitable profit-distribution mechanisms that fund conservation and social initiatives. As Bramwell and Lane [41] and Scheyvens and Watt [42] noted, strong local institutions safeguard resource quality and enhance local economic benefits, serving as a critical determinant of successful community-based tourism. Furthermore, institutional accountability reduces stakeholder conflicts and ensures equitable benefit distribution. Ultimately, empowering local institutions enables communities to exert greater control over tourism development and reduces dependence on external actors.

Operationalising this requires a clear 'Regenerative Fund Allocation Policy'. This policy would legally mandate that a minimum percentage of tourism revenue is allocated to coastal restoration and cultural maintenance, thereby embedding regeneration into the financial operations of the local enterprise. This must be supported by transparent accounting mechanisms and annual public reporting to the village council and customary leaders to guarantee accountability and maintain trust.

3.3.4 Enhancing community participation

Active community participation cultivates a stronger sense of ownership over the tourism destination. This is best achieved through co-creation programmes that involve residents in product design, guide training focused on cultural-ecological narratives, and incentive schemes for conservation. Ruiz-Real et al. [43] emphasized that such direct involvement reinforces destination resilience, while Schianetz and Kavanagh [44] argued it increases motivation to sustain conservation and service efforts. This engagement must be underpinned by transparent benefit-sharing mechanisms, such as revenue-sharing from fees and tours to mitigate social tensions. This transparency is best achieved by mandating a public and decentralized accounting system where financial reports are periodically reviewed during traditional village council meetings. Additionally, continuous training on regenerative tourism principles should be provided to raise awareness of environmental, social, and cultural carrying capacities, thereby enabling residents to act as change agents in promoting regenerative tourism. A concrete incentive would be a 'Community Steward Recognition Programme' that granting tax breaks or priority access to village-owned enterprise funding for individuals and families who actively contribute to ecological monitoring or cultural teaching.

3.3.5 Ecosystem conservation based on local wisdom

Conservation efforts that integrate local wisdom such as establishing customary marine protection zones (*awig-awig*) and restoring coastal ecosystems are fundamental to resource sustainability and can be effectively combined with educational tourism. As Schianetz and Kavanagh [44] noted, community-managed conservation programmes tend to be more effective and enduring. Initiatives like mangrove planting, coral transplantation, and beach clean-ups add experiential value for visitors, who gain a deeper understanding of coastal ecology and become sustainability advocates through direct participation.

Successful implementation requires training residents as ecotourism guides, specialising in marine ecosystems, biodiversity cycles, and traditional conservation practices. Furthermore, empowering local fishers by diversifying their

livelihoods for instance, as marine guides, homestay operators, or eco-artisans supports both ecological and economic resilience.

A key policy action is to formally designate Customary Marine Protected Areas (CMPAs) within village boundaries, to be jointly managed by village and customary institutions. These CMPAs must be established with locally specific enforcement protocols and clearly restricted zones, ensuring regeneration takes precedence over extraction. This management must be financially underpinned by mandating that all fees from guided marine tours within CMPAs are exclusively earmarked for patrol and restoration activities.

3.3.6 Tourist education rooted in local values

Educational programmes for tourists aim to promote behaviours that respect local culture and preserve the environment. This is achieved by establishing interpretation centres that showcase the village's history, culture, and ecology, and by designing tour packages with integrated learning elements such as traditional craft workshops, mangrove ecology tours, or participation in customary rituals. The objective is to transform tourism from a consumptive activity into a transformative learning experience that fosters environmental stewardship and cultural respect. As Ballantyne et al. [45] emphasised, authentic, narrative-driven education significantly enhances long-term environmental awareness and pro-environmental behaviour.

A specific operational measure is the introduction of a 'Regenerative Welcome Briefing' - a compulsory, short orientation delivered via video or session at village entry points or homestays. This briefing outlines local customary law and expected reciprocal conduct, ensuring immediate communication of cultural and environmental standards. Non-attendance could result in an administrative fee or restricted access to sensitive conservation zones, thereby reinforcing the importance of the local code.

3.3.7 Diversification of ecotourism products

Developing a diversified tourism product portfolio is crucial for sustaining economic resilience and long-term destination appeal. By avoiding reliance on a single attraction, tourism villages can mitigate risks associated with shifting market trends or external disruptions. Diversification also helps to distribute visitor flows, reduce pressure on specific sites, and extend economic benefits to various community sectors. Strategies include the development of cultural tourism, culinary tours, handicrafts, and homestay or live-in programs that allow tourists to experience local life. Diversification has been shown to prolong tourists' length of stay and strengthen destination competitiveness [46, 47]. For instance, offering mangrove ecotours, traditional fishing tours, or upcycled marine waste crafts can alleviate pressure on popular snorkeling spots while maintaining environmental carrying capacity. Local storytelling further reinforces the regenerative tourism identity, positioning the destination not merely as a scenic site but as a hub for ecosystem restoration and social empowerment. The strategy should prioritize the establishment of 'Local Supply Chain Mandates', offering tax incentives or priority placement on village booking platforms for tourism operators who source a substantial majority of their inputs (food, labor, craft materials) directly from within the village or adjacent customary areas, thereby reinforcing circular economic benefits.

3.3.8 Strengthening a regenerative local economy

This strategy ensures tourism-derived benefits circulate within the community by strengthening local supply chains for food, souvenirs, and services. It prioritises local employment and implements profit-sharing systems that fund social and conservation programmes. Studies consistently identify local economic empowerment as a basis of sustainable development [42, 48, 49]. By leveraging local resources such as seafood processing, shell crafts, and traditional salt-making revenues are distributed across community layers including fishers, artisans, homestay operators rather than being concentrated externally. This enhances economic inclusivity, reduces disparities, and strengthens product identity through quality training and local branding. Obviously, villages should adopt an inclusivity charter for all village-owned enterprise and affiliated businesses to formalise this. This charter must mandate transparent, skill-based hiring policies that favour local residents and establish a 'Benefit-Sharing Audit' to verify the consistent implementation of equitable revenue distribution.

4. CONCLUSIONS

The integration of regenerative tourism principles with local wisdom in Bali's coastal villages presents a viable paradigm for sustainable development that balances ecological restoration, cultural preservation, and community well-being. This approach strengthens community resilience by leveraging social, cultural, and institutional capital, thereby enhancing adaptive capacity in the face of environmental, developmental, and market pressures. The hierarchical model developed through ISM offers a practical and replicable framework for other villages seeking to implement inclusive, adaptive governance that ensures equitable benefits.

The ISM analysis indicates that sustainable development should commence by strengthening regulatory and institutional frameworks, which subsequently enable effective community participation and resource conservation. These foundational elements, in turn, drive product innovation, local economic empowerment, and tourist education. The synergy among these components creates a regenerative system that safeguards the environment, preserves cultural heritage, and optimises local economic benefits. These findings corroborate previous studies underscoring the necessity of integrating governance, community engagement, conservation, and innovation [50, 51].

A key insight is the role of coastal culture and traditions, which the model positions within the autonomous quadrant. This element functions as a crucial, independent background supporter. Deeply embedded in community life and transmitted intergenerationally, it is not directly shaped by tourism policy. Nevertheless, it remains a vital cultural asset and a foundational source of inspiration for product diversification and educational initiatives.

Despite providing a validated hierarchical model, this study has limitations that suggest fruitful avenues for future inquiry. First, the reliance on ISM, which is based on the consensus of a defined expert panel (N = 9), means the hierarchical structure reflects specific Balinese stakeholder knowledge and requires validation for generalisability to other coastal contexts. Second, the focused case study approach on three villages limits the direct transferability of findings to regions with markedly different customary or governance structures.

Future research should therefore conduct longitudinal studies to assess the model's implementation efficacy over time. A multi-case comparative analysis involving a larger sample of coastal regions would also help verify the model's robustness and scalability across diverse socio-ecological settings. Employing mixed-methods approaches in subsequent work could yield a more comprehensive understanding of the dynamics within regenerative tourism systems.

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