International Conference on Sustainable Tourism and Entrepreneurship

Vol. 01 No.01 August 2026, ISSN: 3163-2912

From Conservation to Value Creation: A Hybrid Socio-Ecological Business Model for Mangrove-Based Marine Educational Tourism in Bintan, Indonesia

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ABSTRACT

Mangrove-based marine educational tourism has significant potential to support sustainable tourism development while strengthening community-based economic activities. However, its implementation often remains fragmented, with limited integration between conservation, education, and local creative industries. This study aims to develop an integrated socio-ecological business model for mangrove-based marine educational tourism in Bintan Regency, Indonesia. A qualitative case study approach was employed, combining field observations, in-depth interviews with tourism stakeholders and MSME actors, and document analysis. Data were analyzed using thematic analysis and mapped into the Business Model Canvas (BMC) integrated with Community-Based Tourism (CBT) principles. The findings reveal that an effective and sustainable tourism model requires the integration of three core elements: (1) mangrove ecosystem conservation as an ecological foundation, (2) experiential educational tourism as a value creation mechanism, and (3) MSME-based creative industries as an economic driver. The proposed model demonstrates how tourism activities can evolve into a co-creation system that links environmental education, local product development, and community empowerment. This study contributes to the literature by introducing a hybrid socio-ecological business model that extends the conventional application of BMC in sustainable tourism contexts. Practically, the model provides a scalable framework for developing integrated coastal tourism systems that enhance environmental awareness, strengthen local economies, and promote long-term sustainability.

Keywords: *Marine educational tourism, mangrove, business model, MSMEs, community empowerment.*

1. INTRODUCTION

Sustainable marine tourism has emerged as a strategic approach to coastal development, particularly in archipelagic countries such as Indonesia, where marine and coastal ecosystems play a crucial role in supporting both ecological balance and local livelihoods. However, increasing pressures from land-use change, resource exploitation, and mass tourism have led to the degradation of coastal ecosystems, including mangrove forests. These challenges highlight the urgent need for alternative tourism models that not only generate economic value but also ensure environmental sustainability and long-term ecosystem resilience.

Sustainable tourism is increasingly recognized as a key driver for achieving the Sustainable Development Goals (SDGs), particularly in promoting inclusive economic growth, environmental conservation, and social equity within tourism systems [10]. Sustainable tourism development requires integrated approaches that balance ecological preservation, socio-cultural integrity, and economic viability across tourism systems [12].

Within this context, marine educational tourism has gained growing attention as a transformative approach that integrates recreation with environmental learning. Unlike conventional tourism, educational tourism emphasizes experiential learning processes that enhance visitors' ecological awareness and pro-environmental behavior. Mangrove ecosystems, in particular, offer significant potential as a foundation for educational tourism due to their ecological functions as coastal protection, blue carbon storage, and critical habitat for biodiversity. Previous studies have highlighted that integrating mangrove conservation into tourism activities can simultaneously increase environmental awareness and provide economic benefits to coastal communities [9], [3].

In parallel, sustainable tourism development is increasingly expected to deliver tangible socio-economic benefits for local communities. The Community-Based Tourism (CBT) approach positions local communities as active stakeholders in tourism planning, management, and benefit-sharing. Empirical studies demonstrate that CBT can strengthen social capital, increase income, and foster a sense of ownership over natural resources [4], [5]. Furthermore, the integration of micro, small, and medium enterprises (MSMEs) into tourism value chains has been recognized as a key driver of local economic resilience, particularly through the development of creative products based on local resources [7].

Despite these advancements, the development of mangrove-based tourism often remains fragmented. Many initiatives focus primarily on nature-based attractions without integrating structured business models or linking tourism activities with local creative industries. In particular, the potential of mangrove-based products, such as natural dyes and sustainable fashion, has yet to be fully integrated into marine educational tourism systems. This gap indicates a lack of integrative frameworks that connect ecological conservation, educational tourism, and local economic development within a single business model.

From a theoretical perspective, the Business Model Canvas (BMC) has been widely used as a strategic tool to map how organizations create, deliver, and capture value [6]. However, its application in sustainable tourism, especially when combined with community-based approaches, remains limited in addressing the complexity of socio-ecological systems. Existing studies tend to apply BMC conventionally without integrating environmental education and creative economy dimensions rooted in local ecosystems such as mangroves.

To address this identified gap, this study develops an integrated business model for mangrove-based marine educational tourism in Bintan Regency, Indonesia, by systematically integrating the Business Model Canvas (BMC) with Community-Based Tourism (CBT) principles. The model emphasizes the integration of mangrove ecosystem conservation, experiential learning activities, and the development of creative economy products, particularly natural dye-based sustainable fashion, as part of a unified tourism value chain. this study contributes to sustainable tourism literature by introducing a hybrid socio-ecological business model that systematically integrates environmental, social, and economic objectives within a unified framework

Specifically, this study aims to: (1) analyze the existing conditions of mangrove-based educational tourism in Bintan Regency; (2) identify the potential integration between tourism activities and mangrove-based MSMEs; and (3) formulate a conceptual business model that supports community empowerment and sustainable tourism development. The findings are expected to provide both theoretical contributions to the literature on sustainable tourism business models and practical implications for policymakers, tourism practitioners, and coastal communities.

In addition, the scalability of mangrove-based marine educational tourism remains a critical challenge. While many initiatives demonstrate local success, their replication across different regions is often constrained by variations in ecological conditions, community capacity, and institutional support. Therefore, this study not only develops a site-specific model but also proposes a transferable framework that can be adapted to other coastal regions with similar socio-ecological characteristics. This approach strengthens the practical relevance of the study and bridges the gap between theoretical development and real-world implementation.

2. LITERATURE REVIEW

2.1 Marine Educational Tourism and Environmental Awareness

Marine educational tourism has been increasingly recognized as an effective approach to fostering environmental awareness through experiential learning. Unlike conventional tourism, which primarily focuses on recreation, educational tourism emphasizes knowledge transfer and behavioral change. Nature-based educational experiences can significantly influence visitors' environmental attitudes and long-term pro-environmental behavior [1]. Meaningful learning in tourism occurs when visitors actively engage with natural environments rather than passively consume experiences [2]. Previous studies have highlighted that the lack of integration between educational tourism and economic value creation limits the long-term sustainability of such initiatives [13].

However, existing studies largely focus on the educational outcomes of tourism without adequately addressing how such activities can be embedded within a sustainable business model framework. As a result, many educational tourism initiatives remain programmatic rather than economically sustainable. This indicates a gap in the integration of environmental education with structured value creation mechanisms within tourism systems.

2.2 Marine Ecosystem in Sustainable Tourism

Mangrove ecosystems play a critical role in coastal protection, biodiversity conservation, and climate change

mitigation through blue carbon sequestration [9], [3]. Their ecological significance has positioned mangroves as key assets in sustainable tourism development, particularly in coastal and island destinations.

Previous research demonstrates that mangrove-based tourism can generate both ecological and economic benefits when properly managed. However, poorly managed tourism activities may lead to environmental degradation, highlighting the importance of balancing conservation and utilization [3]. While the literature acknowledges the ecological and tourism value of mangroves, most studies emphasize conservation and ecotourism practices, with limited attention to their role in supporting local economic innovation, particularly through value-added products derived from mangrove resources.

In this context, the use of mangrove-based natural resources in creative industries, such as natural dyes and sustainable fashion, remains underexplored in tourism research. This suggests a critical gap in linking mangrove conservation with creative economy development as part of an integrated tourism system.

2.3 Community-Based Tourism and Local Empowerment

Community-Based Tourism (CBT) has been widely recognized as an approach that promotes inclusive and sustainable tourism development by positioning local communities as central actors in tourism planning, management, and benefit distribution. CBT emphasizes active community participation, equitable distribution of economic benefits, and local ownership of tourism resources, thereby fostering social equity and long-term sustainability [4].

Empirical studies suggest that CBT can significantly contribute to strengthening social capital, enhancing local institutional capacity, and increasing household income, particularly in rural and coastal areas [5]. In addition, CBT has been associated with increased community awareness of environmental conservation, as local stakeholders become directly involved in managing natural resources and tourism activities.

However, despite its conceptual strengths, the implementation of CBT often faces structural limitations. Many CBT initiatives remain small-scale, fragmented, and highly dependent on external support, which constrains their long-term sustainability and scalability. These challenges are frequently linked to limited managerial capacity, lack of access to broader tourism markets, and weak integration with formal business structures [11].

Furthermore, existing CBT literature tends to focus primarily on social and participatory aspects, while insufficiently addressing the role of economic systems and business model structures in sustaining tourism initiatives. In particular, the integration of micro, small, and medium enterprises (MSMEs) into CBT frameworks remains underexplored, despite their critical role in generating local economic value and diversifying income sources [7]. Similar findings have been reported in previous studies, which indicate that many CBT initiatives struggle to scale due to limited institutional support and weak integration with formal market systems [14].

This gap highlights the need for a more integrated approach that connects CBT principles with structured business models and value creation mechanisms. Such integration is essential to ensure that community-based tourism initiatives are not only socially inclusive but also economically viable and scalable within broader tourism systems.

2.4 Business Model Innovation in Sustainable Tourism

Business models are fundamental in shaping how tourism destinations generate, deliver, and sustain value across different stakeholders. The Business Model Canvas (BMC) provides a structured framework consisting of nine key elements that describe how organizations create, deliver, and capture value. [6]. In tourism studies, BMC has been applied to analyze destination management, service innovation, and value propositions.

However, the application of BMC in sustainable tourism contexts remains largely instrumental and descriptive, often failing to capture the complexity of socio-ecological systems. Tourism models must integrate social and environmental dimensions to achieve long-term sustainability [8]. This suggests that conventional BMC applications need to be adapted to incorporate sustainability principles, including environmental conservation and community empowerment.

Moreover, existing studies rarely integrate BMC with community-based approaches and environmental education, particularly in the context of coastal ecosystems such as mangroves. This limitation indicates the need for a more holistic business model framework that aligns economic objectives with ecological and social values.

Based on the review above, several critical gaps can be identified (1) Lack of integration between marine educational tourism and structured business models, resulting in initiatives that are educationally valuable but economically unsustainable. (2) Limited exploration of mangrove-based creative industries, such as natural dye and sustainable fashion, within tourism systems. (3) Insufficient linkage between Community-Based Tourism (CBT) and MSME-driven value chains, particularly in coastal destinations. (4) Conventional use of Business Model Canvas (BMC) that does not fully incorporate socio-ecological complexity, including environmental education and conservation-based value creation.

To address these gaps, this study proposes an integrated conceptual framework that combines marine educational tourism, mangrove ecosystem utilization, MSME-based creative economy, and community empowerment within a unified business model. By integrating the Business Model Canvas (BMC) with Community-Based Tourism (CBT), this research advances a hybrid socio-ecological business model that

captures the interdependencies between environmental sustainability, local economic development, and experiential learning.

This approach not only extends the application of BMC in sustainable tourism studies but also introduces a novel perspective on how mangrove ecosystems can function as both ecological assets and drivers of creative economic value within tourism systems.

3. METHOD

This study employs a qualitative case study approach with a model development orientation to explore and develop a sustainable business model for mangrove-based marine educational tourism in Bintan Regency, Indonesia. A qualitative approach is appropriate as the study aims to understand complex socio-ecological interactions, including community participation, tourism practices, and the integration of creative economic activities within mangrove ecosystems.

The research adopts an exploratory and constructive design, where empirical findings are used to develop a conceptual business model that integrates environmental, social, and economic dimensions. This approach enables an in-depth understanding of real-world practices while also generating a replicable framework.

The study was conducted in Bintan Regency, Riau Islands Province, Indonesia, focusing on four mangrove-based tourism sites: Mangrove Bintan Lestari, Mangrove Ekang, Pengudang Bintan Mangrove, and Mangrove Berakit Panglong.

These sites were selected using a purposive sampling strategy based on the following criteria:

1. Active implementation of mangrove-based tourism activities,
2. Involvement of local communities in tourism management,
3. Presence of potential or existing mangrove-based creative economic activities, and
4. Representation of diverse ecological and management characteristics.

The selection of multiple sites enables cross-case insights and enhances the robustness of the proposed model.

Data were collected through multiple qualitative techniques to ensure depth and triangulation. Direct observations were conducted to examine tourism activities, visitor interactions, mangrove conservation practices, and the production process of mangrove-based products such as natural dyes and batik. Observations focused on operational workflows and sustainability practices within each site.

In-depth interviews were conducted with key stakeholders, including: mangrove tourism managers, local community members, MSME actors (particularly those involved in mangrove-based products), and relevant institutional representatives. Informants were selected using purposive sampling to ensure relevance and knowledge of the subject. Interviews explored perceptions of tourism development, economic opportunities, challenges, and sustainability strategies.

Supporting documents were analyzed, including tourism reports, local development plans, visitor data, MSME production records, and policy documents related to sustainable tourism and the creative economy. These documents were used to validate and enrich field data.

Data were analyzed using a thematic analysis approach involving the following steps:

a. Data familiarization through transcription and repeated reading,
b. Open coding to identify key themes related to tourism activities, community involvement, and economic integration,
c. Categorization of themes into broader dimensions such as conservation, education, and creative economy, and
d. Synthesis of findings to construct an integrated business model.

The analysis was guided by the principles of the triple bottom line (people, planet, profit) to ensure that environmental, social, and economic aspects were systematically incorporated.

The business model was developed by integrating empirical findings into the Business Model Canvas (BMC), which comprises nine key elements: customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships, and cost structure.

To enhance contextual relevance, the BMC framework was integrated with Community-Based Tourism (CBT) principles, emphasizing community participation, equitable distribution of benefits, and local empowerment. The Business Model Canvas (BMC) was applied as a structured framework to translate thematic findings into a coherent business model.

4. FINDINGS AND DISCUSSION

The analysis reveals that mangrove-based marine educational tourism in Bintan Regency is characterized by a distributed, community-driven system, rather than a centralized tourism model. Tourism activities are organized across multiple mangrove areas, each with distinct ecological characteristics and management approaches.

This decentralized configuration enables the diversification of tourism experiences while reducing ecological pressure on individual sites. Instead of concentrating visitor activities in a single location, the system distributes environmental impact spatially, which aligns with sustainable tourism principles.

Community participation is embedded throughout the tourism system. Local residents are actively involved not only as operational actors—such as guides, boat operators, and facilitators—but also as decision-makers in tourism planning and environmental management. This reflects the core principles of Community-Based Tourism (CBT), where communities are positioned as primary stakeholders in value creation.

Furthermore, the tourism model emphasizes educational content, integrating mangrove ecology, coastal conservation, and climate change awareness into

tourism activities. The design of tourism packages is adapted to different visitor segments, including students, researchers, general tourists, and corporate groups, indicating a shift toward experience-based and knowledge-oriented tourism.

The findings further reveal the emergence of an integrated system that connects tourism activities with mangrove-based creative industries. This model embeds production processes into the tourism experience itself. Visitors are engaged in hands-on activities such as extracting natural dyes from mangrove materials, applying dyeing techniques, and understanding the ecological and cultural significance of mangrove-based products.

This transformation demonstrates a shift from passive consumption toward a co-creation process in tourism experiences. The experience goes beyond observation, enabling direct interaction between tourists, local communities, and natural ecosystems.

From a value chain perspective, this model links:

- upstream resources (mangrove ecosystems),
- core activities (educational tourism), and
- downstream outputs (creative products).

This integrated approach addresses the gap identified in the literature, where tourism, conservation, and the creative economy are often treated as separate domains The highlights of mangrove-based creative production into tourism activities contributes significantly to the development of local MSMEs. The findings indicate that this model enhances:

- technical skills in natural dye processing,
- product innovation and differentiation, and
- direct access to tourism markets.

In contrast to mass-produced souvenirs, the products generated within this system are positioned as experience-based and environmentally meaningful goods, incorporating narratives of sustainability, conservation, and local identity.

This positioning increases the perceived value of the products and allows MSMEs to operate within a premium and niche market segment, rather than competing in low-cost mass markets.

Moreover, MSMEs play a dual role in the system:

1. As economic actors generating income, and
2. As knowledge transmitters contributing to environmental education.

This expands the role of MSMEs beyond traditional economic functions and strengthens their contribution to sustainable tourism development.

The sustainability of the tourism model is strongly influenced by multi-stakeholder collaboration, involving local communities, tourism managers, MSMEs, educational institutions, and private sector actors.

Educational institutions contribute by integrating tourism into learning activities and research programs, while private sector involvement, particularly through corporate social responsibility (CSR) initiatives, supports financial sustainability and program development.

However, the findings also highlight several structural challenges:

- coordination complexity among multiple tourism sites,
- limited human resource capacity, and
- dependence on external stakeholders.

These challenges indicate that the long-term sustainability of the model requires:

- stronger institutional frameworks,
- standardized operational procedures, and
- continuous capacity-building initiatives.

Furthermore, based on thematic analysis, this study proposes a hybrid socio-ecological business model that integrates environmental conservation, educational tourism, and creative economic development.

The model is structured around four interconnected subsystems:

1. Ecological subsystem – mangrove ecosystems as conservation and learning spaces,
2. Tourism subsystem – experiential educational activities,
3. Economic subsystem – MSME-based creative production, and
4. Institutional subsystem – multi-stakeholder governance and partnerships.

These subsystems interact dynamically, forming a circular system where:

- conservation supports tourism,
- tourism supports economic activities, and
- economic activities reinforce conservation efforts.

This model reflects a shift from linear tourism systems to integrated socio-ecological systems, where value is co-created across environmental, social, and economic dimensions.

4.1 Business Model Canvas Interpretation

The findings of this study not only confirm existing theories but also extend current knowledge by demonstrating the practical integration of environmental education, community empowerment, and creative economy within a unified business model. The Business Model Canvas (BMC) analysis provides a structured representation of the proposed model and reveals several key innovations compared to conventional tourism business models.

First, the value proposition extends beyond recreational experiences to include environmental education, participatory conservation, and creative engagement. This creates a multi-layered value offering that is difficult to replicate in mass tourism contexts.

Second, the customer segments are oriented toward niche and purpose-driven markets, including educational institutions, environmentally conscious tourists, and corporate sustainability programs. This indicates a transition from quantity-based tourism to impact-oriented tourism.

Third, the revenue streams are diversified, combining tourism services, product sales, workshops, and institutional partnerships. This diversification enhances resilience and reduces dependency on visitor volume.

Fourth, the key resources are conceptualized as socio-ecological assets, where mangrove ecosystems are not only natural attractions but also sources of knowledge, materials, and innovation.

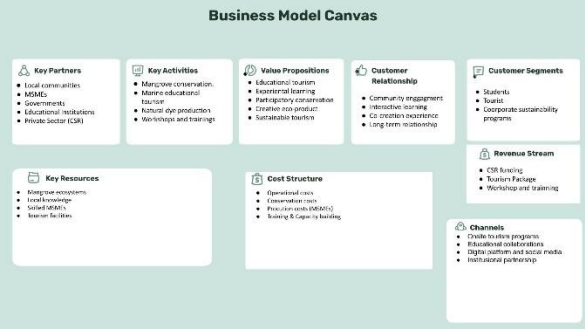


Figure 1. Business Model Canvas Mangrove-Based Marine Education Tourism

Figure 1 illustrates the Business Model Canvas (BMC) developed in this study, highlighting the integration of mangrove ecosystem conservation, educational tourism, and MSME-based creative economy activities. The model emphasizes value co-creation through participatory learning experiences, supported by multi-stakeholder collaboration involving local communities, government institutions, and private sector actors. Furthermore, the model demonstrates how ecological resources are transformed into socio-economic value through diversified revenue streams and sustainable tourism practices.

The Business Model Canvas (BMC) developed in this study illustrates an integrated socio-ecological system that connects mangrove conservation, educational tourism, and MSME-based creative economy within a unified framework.

From the value proposition perspective, the model offers a multi-dimensional experience that combines educational tourism, experiential learning, participatory conservation, and creative eco-products. This integrated value proposition differentiates the model from conventional tourism by emphasizing not only recreational experiences but also environmental education and active visitor engagement.

In terms of customer segments, the model targets a diverse yet purpose-driven market, including students, general tourists, and corporate sustainability programs. This segmentation reflects a shift toward impact-oriented tourism, where visitors seek meaningful and educational experiences rather than purely leisure-based activities.

The customer relationships component highlights participatory and co-creation-based interactions. Visitors are actively engaged in learning processes, such as mangrove education and natural dye production, while interacting directly with local communities. This approach fosters deeper engagement, enhances visitor experience, and supports long-term relationships through repeat visits and institutional collaborations.

The channels utilized in this model include on-site tourism programs, educational collaborations, digital platforms, and institutional partnerships. These channels enable both direct engagement with visitors and broader outreach to educational institutions and sustainability-oriented organizations.

Key activities, including mangrove conservation, marine educational tourism, natural dye production, and capacity-building workshops, support the model. These activities are interconnected and form the core operational processes that generate both ecological and economic value.

The key resources are conceptualized as socio-ecological assets, including mangrove ecosystems, local knowledge, skilled MSMEs, and tourism infrastructure. Unlike conventional business models, natural ecosystems in this model function not only as resources but also as central drivers of value creation.

The key partnerships involve collaboration among local communities, MSMEs, government agencies, educational institutions, and private sector actors through CSR programs. This multi-stakeholder collaboration is essential for ensuring the sustainability and scalability of the tourism model.

From a financial perspective, the revenue streams are diversified, including tourism packages, product sales, workshops, and CSR funding. This diversification reduces dependency on a single income source and enhances economic resilience.

Meanwhile, the cost structure consists of operational costs, conservation activities, MSME production costs, and training programs. These costs reflect the integrated nature of the model, where environmental, social, and economic investments are interconnected.

Finally, the integration of BMC with Community-Based Tourism (CBT) principles ensures that community participation, benefit distribution, and local empowerment are embedded within each element of the business model.

4.2 Circular Value Creation and Reinforcement Loop

The proposed model conceptualizes mangrove-based marine education tourism as an integrated socio-ecological system composed of four interrelated subsystems: ecological, tourism, economic, and institutional. Each subsystem plays a distinct role while simultaneously contributing to a dynamic value co-creation process.

The ecological subsystem represents mangrove ecosystems as the foundation for conservation and environmental learning. The tourism subsystem transforms these ecological resources into experiential and educational activities that enhance visitor engagement and environmental awareness. The economic subsystem captures value through MSME-based creative industries, particularly through the development of mangrove-derived products. Meanwhile, the institutional subsystem facilitates governance, stakeholder collaboration, and long-term sustainability.

These sub-systems operate within a circular value-creation loop, in which conservation supports tourism, tourism generates economic value, and economic activities reinforce conservation efforts. This integrated

structure reflects the principles of the triple bottom line (people, planet, profit), ensuring a balanced approach to sustainable tourism development.

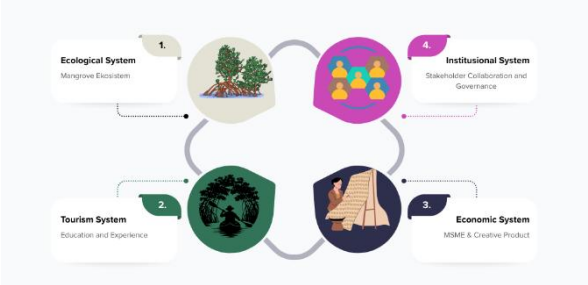


Figure 2 Socio Ecological Tourism System

The model consists of four interconnected subsystems. The ecological subsystem represents mangrove ecosystems as the foundation of conservation and learning spaces. The tourism subsystem focuses on experiential educational activities that transform natural resources into meaningful visitor experiences. The economic subsystem highlights the role of MSME-based creative industries in generating value-added products derived from mangrove resources. Meanwhile, the institutional subsystem reflects multi-stakeholder collaboration involving local communities, government, and supporting organizations.

These subsystems are not independent but operate within a circular interaction system. The ecological subsystem supports tourism activities, tourism activities generate economic opportunities, and economic activities reinforce conservation efforts. This circular relationship reflects a transition from a linear tourism model to an integrated socio-ecological system.

Furthermore, the model aligns with the triple bottom line framework (people, planet, profit), ensuring a balanced integration of environmental sustainability, social inclusion, and economic viability. In terms of scalability, the modular structure of the model allows it to be adapted to other coastal regions with similar socio-ecological characteristics. This enhances its practical applicability and strengthens the linkage between theoretical contribution and real-world implementation.

4.3 Discussion

This study provides important insights into how mangrove-based marine educational tourism can be developed as an integrated socio-ecological system that simultaneously supports environmental conservation, community empowerment, and economic value creation.

A key contribution of this study lies in its emphasis on scalability and transferability. Unlike many community-based tourism models that remain localized, the proposed socio-ecological framework provides a structured approach that can be adapted across different coastal contexts. The modular structure of the model consisting of ecological, tourism, economic, and institutional subsystems allows for flexible implementation depending on local conditions.

Furthermore, this study strengthens the linkage between theoretical constructs and practical implementation. While previous studies often treat environmental education, community empowerment, and economic development as separate domains, this research demonstrates how these components can be operationalized within a unified business model. This integration not only enhances theoretical understanding but also provides actionable insights for policymakers and practitioners seeking to develop sustainable tourism systems.

Consistent with previous studies, the findings confirm that educational tourism plays a significant role in enhancing environmental awareness and pro-environmental behavior among visitors [1], [2]. However, this study extends existing literature by demonstrating that educational tourism can also function as a driver of economic value creation when integrated with MSME-based creative industries. This finding addresses a key limitation in prior research, which has largely treated educational tourism as a non-commercial or programmatic activity.

In line with research on mangrove ecosystems, this study reaffirms that mangroves are critical assets for sustainable tourism due to their ecological functions and contribution to coastal resilience [3], [9]. Nevertheless, this study advances the literature by repositioning mangrove ecosystems not only as conservation assets but also as sources of innovation and value-added production, particularly through the development of natural dye-based products. This highlights a shift from conservation-oriented tourism toward value-creation-based tourism systems.

The findings also support the theoretical foundations of Community-Based Tourism (CBT), which emphasize local participation, equitable benefit distribution, and community ownership [4], [5]. Community involvement in tourism activities, as observed in this study, strengthens social capital and enhances local capacity. However, this study further reveals that participation alone is insufficient to ensure sustainability. Without structured business models, CBT initiatives tend to remain fragmented and limited in scale, as also identified in previous studies [11].

Therefore, this research contributes to the literature by demonstrating the importance of integrating CBT principles with structured business frameworks, such as the Business Model Canvas (BMC). This integration addresses the gap identified in prior studies, where tourism, conservation, and the creative economy are often treated as separate domains.

Furthermore, this study advances the application of the Business Model Canvas (BMC) by reconceptualizing it as a socio-ecological analytical framework capable of capturing the complexity of sustainable tourism systems. Unlike conventional BMC applications that primarily focus on economic value creation, the proposed model integrates environmental, social, and economic dimensions, aligning with the principles of sustainable

development and the Sustainable Development Goals (SDGs) [10].

The integration of MSMEs into the tourism value chain represents another significant contribution of this study. Consistent with previous research [7], MSMEs play a critical role in enhancing local economic resilience and diversifying income sources. However, this study extends existing knowledge by demonstrating how MSMEs can also function as agents of environmental education and cultural transmission within tourism systems. This finding aligns with recent studies emphasizing the importance of systems thinking and integrated value creation in achieving sustainable tourism development [15].

Overall, the findings suggest a transition from linear tourism models toward integrated and circular socio-ecological systems, where conservation, education, and economic activities are mutually reinforcing. This aligns with contemporary perspectives on sustainable tourism, which emphasize the need for holistic and system-based approaches to tourism development.

5. CONCLUSIONS

The findings of this study indicate that mangrove-based marine educational tourism in Bintan Regency represents a viable pathway for integrating environmental conservation, experiential learning, and local economic development within a single, coherent system. By moving beyond conventional tourism models that prioritize visitor volume, the findings highlight the potential of experience-based and impact-oriented tourism as a more sustainable alternative for coastal destinations.

A key contribution of this research lies in the identification of an integrated socio-ecological business model that connects mangrove ecosystem management, educational tourism activities, and MSME-based creative industries particularly natural dye and sustainable fashion production. This integration not only enhances the quality of tourist experiences but also creates a continuous value chain that links ecological resources with economic outputs and community empowerment.

From a theoretical perspective, this study extends the application of the Business Model Canvas (BMC) by transforming it into a hybrid analytical framework that incorporates Community-Based Tourism (CBT) principles and sustainability dimensions. Unlike conventional BMC applications that primarily emphasize economic value creation, the proposed model captures the interdependencies among environmental, social, and economic systems, thereby contributing to the advancement of sustainable tourism business model literature.

From a practical standpoint, the findings provide strategic insights for tourism practitioners and destination managers on how to design tourism products that integrate education, conservation, and creative economy development. The model highlights the importance of multi-stakeholder collaboration, diversification of revenue streams, and the positioning of local communities as central actors within the tourism value chain.

In terms of policy implications, the study suggests that government and institutional support are essential in strengthening governance structures, enhancing community capacity, and facilitating partnerships between tourism actors, MSMEs, and educational institutions. Such support is necessary to ensure the scalability and long-term sustainability of mangrove-based tourism models.

Despite these contributions, this study is not without limitations. The research is based on a qualitative case study approach within a specific regional context, which may limit the generalizability of the findings. Future research should incorporate comparative studies across different coastal regions, as well as quantitative assessments to evaluate the economic, social, and environmental impacts of the proposed model.

Overall, this study confirms that mangrove ecosystems can function not only as conservation assets but also as drivers of innovation, education, and sustainable economic development. The proposed business model provides a conceptual foundation for rethinking coastal tourism development toward more integrated, resilient, and sustainability-oriented systems.

This research provides a strategic foundation for reimagining coastal tourism development toward more resilient, inclusive, and sustainability-driven system.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to Politeknik Bintan Cakrawala and Politeknik Negeri Batam for their continuous academic and institutional support.

This research was funded by the Directorate of Research, Technology, and Community Service (Diktiristek/Diktiminatsaintek) and supported by the Indonesia Endowment Fund for Education (LPDP), whose contributions have significantly enabled the successful completion of this research.

The authors also acknowledge the invaluable support of local communities, mangrove tourism managers, and MSME actors in Bintan Regency, whose participation and knowledge have been essential to this research.

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