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# Pro-Environmental Behaviour in Tourism: A Systematic Literature Review and Future Research Directions

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***Abstract***

*As one of the largest global economic sectors, tourism significantly contributes to economic and social development. However, it is also a leading cause of environmental degradation, including ecosystem disruption, carbon emissions, and resource exploitation. Tourists ' pro-environmental behavior (PEB) is crucial in mitigating tourism's adverse effects through sustainable actions like responsible waste management and green transportation. This study employs a Systematic Literature Review method to synthesize research on PEB in tourism from 2013 to 2023. Drawing from 24 peer-reviewed articles from the Scopus database, the review identifies key themes: intrinsic and extrinsic behavioral drivers, the transformative role of technology, emotional engagement, organizational and community-level factors, and the unique challenges of rural tourism. The findings reveal that intrinsic factors, such as personal norms and moral obligations, are foundational drivers of PEB, while extrinsic factors, including environmental policies and supportive infrastructure, enable sustainable actions. Technology, particularly AI, social media, blockchain, and augmented reality, emerges as a dynamic antecedent, enhancing transparency and decision-making in sustainable tourism practices. Emotional engagement, such as awe and attachment to destinations, amplifies tourists' long-term commitments to sustainability. However, significant research gaps remain, including the need for longitudinal studies, geographic diversity, and cross-cultural analyses. The study proposes a conceptual model integrating these factors with sociocultural contexts, moderating their effectiveness. This model offers theoretical insights and practical implications for policymakers, destination managers, and researchers. The tourism sector can promote PEB and advance sustainable practices globally by addressing identified gaps and adopting innovative strategies.*

Keywords: Pro-Environmental Behavior; Sustainable Tourism; Community-Based Tourism; Green Human Resource Management; Tourism Technology Integration

## INTRODUCTION

Despite its positive contributions, tourism has become one of the main causes of environmental degradation, including ecosystem damage, carbon emissions, and resource exploitation (Lusseau & Mancini, 2018). (Mahmud, 2024) notes that the increase in tourism activity in conservation areas disrupts the ecological balance crucial for species survival, emphasizing the need for conservation-based interventions. In this context, tourists' pro-environmental behavior (PEB) plays a key role in mitigating the negative impacts of tourism through actions such as sustainable transportation and responsible waste management (Vaithianathan, 2024). Despite the literature identifying factors that drive and hinder PEB, systematic research integrating findings across different contexts remains limited. This review seeks to address this gap by comprehensively understanding PEB in tourism.

Pro-environmental behavior in tourism is influenced not only by individual awareness but also by external factors such as eco-friendly facilities, destination policies, and social interactions (Halim & Lumanauw, 2023). Previous studies indicate that these factors often interact. For instance, while tourists may intend

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to act sustainably, limited information or access to sustainable practices often inhibits their actions on the ground (Solberg & Smiley, 2022). Furthermore, (Nyimbi, 2024) emphasizes that tourism development in developing countries frequently neglects reinvestment in environmental conservation, exacerbating negative impacts on local ecosystems. Therefore, understanding the drivers and barriers to PEB in tourism is essential to creating more sustainable destinations while balancing environmental conservation and socio-economic benefits.

To gain deeper insights into tourists' pro-environmental behavior, several studies have employed theoretical models such as the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) Model to analyze factors influencing tourists' decisions to adopt sustainable practices (An et al., 2022; Sulistyaningrum et al., 2022). TPB highlights the role of attitudes, subjective norms, and perceived behavioral control in shaping tourists' intentions to act pro-environmentally. Conversely, the VBN Model underscores how personal values and environmental beliefs shape moral responsibility, ultimately driving pro-environmental actions. While these approaches provide valuable insights, cross-cultural studies, and socio-economic context analyses remain underexplored.

In addition to theoretical approaches, external factors such as government policies and destination management strategies also play critical roles in promoting tourists' pro-environmental behavior. For example, destinations that provide eco-friendly facilities, such as low-emission transport networks, proper waste management systems, and sustainable accommodations, tend to be more successful in encouraging tourists to participate in sustainable practices (Nyimbi, 2024; Vaithianathan, 2024). Furthermore, incentive-based policies, such as discounts for green transportation or penalties for environmentally harmful behaviors, have proven effective in some developed countries (Lusseau & Mancini, 2018). However, in developing countries, challenges such as funding limitations and a lack of political support hinder the implementation of sustainability-focused policies, necessitating collaboration between governments, private sectors, and local communities.

Although increasing attention has been given to tourists' pro-environmental behavior, global challenges such as climate change, rising tourist numbers, and growing pressure on natural resources underscore the need for more sustainable tourism approaches. A systematic literature review is critical to addressing a fundamental question: how can the interplay between individual factors, external factors, and policies be leveraged to support sustainable tourism? Thus, this review provides a foundation for developing more effective strategies to integrate sustainability into tourism practices. This article aims to present a systematic literature review on tourists' pro-environmental behavior, focusing on identifying key trends and research gaps and guiding policymakers, destination managers, and researchers. Specifically, the review explores how internal factors (such as environmental awareness and individual values) and external factors (such as government policies and destination facilities) influence tourist behavior. The structure of this article begins with a methodology section, followed by an analysis of the main findings and discussions, and concludes with implications for future research.

## METHODS

This study adopts a Systematic Literature Review (SLR) approach to identify, evaluate, and synthesize relevant literature on pro-environmental behavior (PEB) in the context of tourism. The SLR method was chosen as it provides a comprehensive understanding of trends, gaps, and theoretical contributions in the field while ensuring transparency and reproducibility. The research process follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to maintain systematicity and quality throughout the review. The included articles are peer-reviewed publications from the last ten years (2013–2023) that discuss tourists' PEB, including its drivers, barriers, and impacts on destination sustainability. Articles were also selected based on their use of relevant theoretical frameworks, such as the Theory of Planned Behavior (TPB) or the Value-Belief-Norm (VBN) Model, and publications in English or Indonesian. Conversely, non-peer-reviewed articles, studies unrelated to tourism contexts, and inaccessible literature were excluded from the review.

The literature search was conducted using the Scopus database, which provides a wide range of high-quality academic journals. Keywords such as "pro-environmental behavior in tourism," "sustainable tourism practices," and "drivers of eco-friendly tourism" were employed, with Boolean operators (AND, OR) applied to enhance the relevance of results. All search results were manually screened to eliminate duplicates and irrelevant articles. A PRISMA flow diagram was utilized to visualize the literature selection process, from the initial search to the final selection of articles, ensuring transparency in the methodology.

The selection process was conducted in three main stages. The first stage involved an initial screening, where articles were assessed based on titles and abstracts to determine their suitability according to the inclusion criteria. Articles passing this stage were then reviewed to ensure the relevance and quality of their content. The final stage involved an in-depth analysis of articles meeting all criteria, aiming to identify key findings, methodologies used, and contributions to the literature. A content analysis approach was applied to extract key themes and research trends, while bibliometric analysis was employed to evaluate geographical distribution, publication trends by year, and dominant theoretical frameworks. The results of these analyses are presented in tables and visualizations, providing deeper insights into PEB in tourism. This comprehensive and systematic approach ensures that the study captures the complexity and nuances of PEB within the tourism context, offering a solid foundation for understanding and advancing the field.

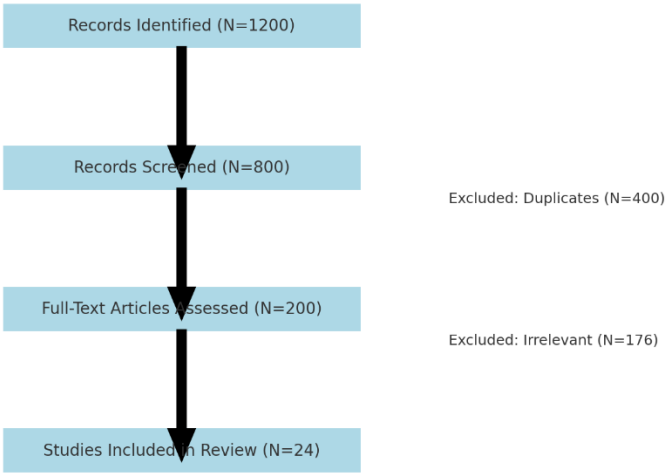


**Figure 1. PRISMA Flow Diagram**

The literature selection process in this study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and systematicity. All articles analyzed were sourced from the Scopus database and selected for their comprehensive coverage of high-quality academic journals. Initially, 1200 articles were identified using keywords such as "pro-environmental behavior in tourism" and "sustainable tourism practices." Boolean operators (AND, OR) were applied to refine the search and improve the relevance of results. During the initial screening, 800 articles were selected after removing 400 duplicates. Further screening involved reviewing titles and abstracts to ensure the articles met inclusion criteria, including a focus on pro-environmental behavior in tourism contexts, the use of relevant theoretical frameworks, and publication in English or Indonesian.

The next stage involved a full-text evaluation of the 200 articles that passed the initial screening. Articles that did not meet the inclusion criteria, such as those lacking relevance to the research focus or empirical data, were excluded. One hundred seventy-six articles were removed at this stage, leaving 24 for final analysis. The selected articles cover key themes such as intrinsic and extrinsic drivers of pro-environmental behavior, destination policies' impact, and technology's role in supporting sustainability. Visualized through a PRISMA diagram, the selection process ensures the analysis was conducted systematically, including only high-quality and relevant articles. This approach provides a robust foundation for synthesizing the literature in this study.

## RESULT

*Trends in Research*

The analysis of 24 articles sourced from Scopus reveals notable trends in research on pro-environmental behavior (PEB) in tourism over the last decade (2013–2023). Figure 2 illustrates the growth trajectory of publications, highlighting a steady increase in academic interest, with a peak in 2021. This surge reflects the heightened urgency of sustainability issues within the tourism sector, likely driven by global movements toward climate action and the adoption of the Sustainable Development Goals (SDGs). However, the slight plateau observed in subsequent years suggests a saturation of traditional approaches, underscoring the need for innovative methodologies and underexplored perspectives to sustain research momentum.

Figure 3 visualizes the geographic distribution of studies, revealing a significant concentration in Asia (42%) and Europe (25%). This dominance can be attributed to the rapid growth of tourism markets in Asia and Europe's established focus on sustainability in policymaking and tourism practices. Conversely, North America

(17%) and Africa (8%) are underrepresented, highlighting the need for increased research in these regions. Despite its vast natural and cultural resources, the limited representation from Africa suggests potential barriers such as funding constraints, limited access to academic platforms, and a lack of integration between global sustainability initiatives and local tourism policies. Expanding research efforts in these underrepresented regions would enhance the generalizability of findings and provide valuable insights into culturally specific factors influencing PEB.

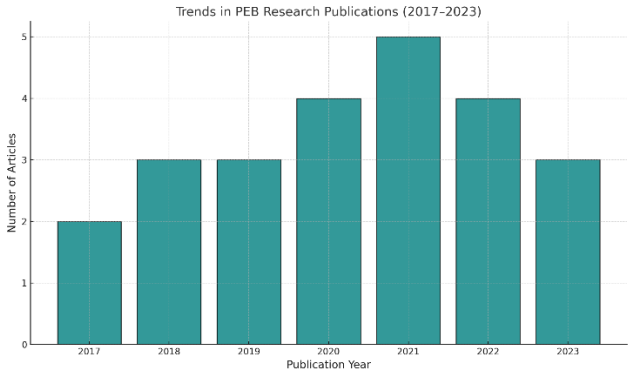


**Figure 2. Publication Trends on Pro-Environmental Behavior in Tourism (2017–2023)**

Source: Reserach data, 2024

The upward trajectory observed in publication trends reflects the growing recognition of tourism's environmental impact. Key milestones, such as the adoption of the Paris Agreement in 2015 and the SDGs in 2016, likely influenced the surge in research from 2017 onwards. The peak in 2021 aligns with increased global discussions on sustainable recovery following the COVID-19 pandemic. During this period, researchers focused on integrating sustainability into tourism policies as part of broader economic recovery plans. The subsequent plateau, however, indicates a possible stagnation in research innovation or shifts in funding priorities. Future studies could explore emerging topics such as post-pandemic behavioral shifts, the role of technology in PEB, and the integration of advanced analytics in tourism sustainability.

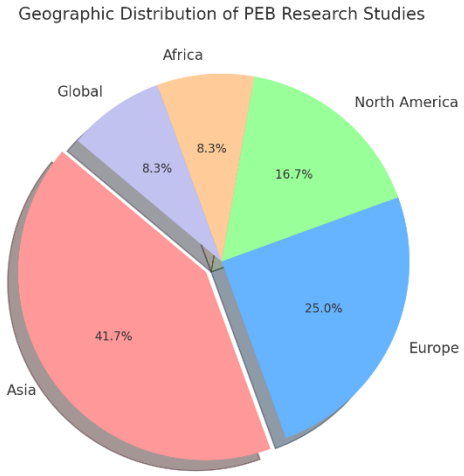


**Figure 3. Geographic Distribution of Studies**

Source: Reserach data, 2024

Asia's dominance in PEB research reflects its role as a leading global tourism market, driven by countries like China, India, and Indonesia. The emphasis on sustainability in Asian studies may also stem from the region's vulnerability to environmental challenges such as climate change and biodiversity loss. European research contributions, meanwhile, are underpinned by the region's strong regulatory frameworks and initiatives like the European Green Deal, which prioritizes sustainable tourism development. These findings emphasize the dynamic and evolving nature of PEB research in tourism, highlighting both achievements and areas for improvement. Expanding geographic scope and integrating emerging themes, such as digital innovation and post-pandemic behavioral changes, will be crucial for advancing the field.

*Key Themes and Findings*

An analysis of the 24 reviewed articles reveals five complementary themes that shape pro-environmental behavior (PEB) in the tourism sector. Each theme provides in-depth insights into behavioral drivers, the role of technology, emotional engagement, organizational factors, and the challenges and opportunities within rural tourism. Below is a detailed review of each theme, as portrayed in Table 1.

**Table 1. Comprehensive Findings from the 24 Articles on PEB in Tourism**

| Theme | Key Insights | Relevant Articles | Research Gaps |
|---|---|---|---|
| Intrinsic Factors | Personal norms, environmental awareness, and moral obligations drive PEB, supported by theories like TPB and VBN. | (Y. Joo et al., 2020; Raza et al., 2024; Sulistyaningrum et al., 2022) | Limited cross-cultural studies to explore intrinsic motivations globally and underrepresented regions. |
| Extrinsic Factors | Destination policies, eco-friendly infrastructure, and incentives enable sustainable behaviors. Challenges include accessibility and alignment with local cultures. | H(J. H. Han et al., 2015; Lusseau & Mancini, 2018; Nyimbi, 2024; Vaithianathan, 2024) | The effectiveness of policies in developing regions and rural destinations remains underexplored. |
| Technology | AI, social media, blockchain, and AR have the potential to enhance decision-making and awareness, though advanced technologies remain underexplored. | (W. Han et al., 2018; Kim, 2021; Majid et al., 2024; Vaithianathan, 2024) | Blockchain and AR require more application-focused studies in tourism. The impact of spillover effects on long-term behaviors is unclear. |
| Emotional Engagement | Awe and emotional attachment strengthen long-term commitment to sustainability, especially in eco-friendly destinations. | (An et al., 2022; Wang et al., 2021; Yan & Jia, 2021) | Longitudinal impacts of emotional experiences on PEB need evaluation. How to optimize awe-inducing destinations is underexplored. |
| Community and Organizational Factors | Green HRM practices and CBT empower communities, fostering structural support for PEB in tourism. GHRM scalability in larger organizations remains a challenge | (Elshaer et al., 2021; Halim & Lumanauw, 2023; J. H. Han et al., 2015; Solberg & Smiley, 2022) | Challenges in scaling GHRM and CBT practices in larger organizations. The role of local leadership and training in CBT remains unclear. |
| Rural Tourism | Rural tourism presents opportunities for sustainability but faces challenges like limited resources, technical capacity, and balancing economic-environmental goals. | (Gidebo, 2022; Rao et al., 2022; Warinda, 2023) | More collaborative strategies are required to balance economic and environmental goals. Underexplored potential of community leadership in driving sustainability |

Source: Research Data, 2024

1. *Behavioral Drivers of PEB*

Behavioral drivers can be categorized into two primary groups: intrinsic and extrinsic. Intrinsic factors, such as personal norms, environmental awareness, and moral obligation, are significant motivators for pro-environmental behavior (PEB). For instance, (D. Joo et al., 2020) identified subjective norms as a crucial element influencing tourists' intentions to act pro-environmentally. This finding aligns with the Theory of Planned Behavior (TPB), which emphasizes the roles of attitudes, social norms, and perceived behavioral control in shaping intentions and actions. Similarly, (Raza et al., 2024) found that moral obligation plays a more prominent role in rural contexts, where tourists' interactions with the environment often foster a stronger sense of ecological responsibility.

Extrinsic factors, such as destination policies and sustainable infrastructure, also play a vital role in shaping PEB. (J. H. Han et al., 2015) demonstrated that supportive facilities, such as green transportation networks and adequate waste management systems, help bridge the gap between tourists' intentions and behaviors. However, findings indicate that the success of extrinsic factors depends on their alignment with tourists' internal motivations. For example, infrastructure improvements are most effective when they resonate with tourists' values and norms. Thus, a synergistic approach integrating intrinsic and extrinsic factors is essential to maximize the impact of PEB. By addressing both the internal motivations and external conditions of tourists, stakeholders can create environments that encourage and sustain pro-environmental actions. This interplay highlights the need for psychologically informed and practically supportive strategies to achieve lasting behavioral change.

2. *Role of Technology*

Technology has emerged as a transformative tool in facilitating and promoting pro-environmental behavior (PEB), primarily through digitalization and automation. As analyzed by (Majid et al., 2024), AI-driven chatbots provide tourists with personalized information, encourage self-reflection, and inspire sustainable actions. These technologies reshape how tourists make decisions and create spillover effects, where one pro-environmental action triggers subsequent actions, reinforcing a cycle of sustainability. Social media, on the other hand, plays a significant role in establishing social norms through user-generated content (UGC). (W. Han et al., 2018) found that tourists who share their sustainable experiences online influence their friends and followers to adopt similar behaviors. Beyond raising awareness, UGC serves as a tool for social validation, reinforcing individuals' commitment to sustainability by creating a sense of collective accountability and inspiration.

While AI and social media have demonstrated substantial potential, more advanced technologies like blockchain and augmented reality (AR) remain underexplored. Blockchain could track tourists' carbon footprints transparently, providing accountability and encouraging informed decisions. Meanwhile, AR can create virtual educational experiences, enabling tourists to understand the environmental impacts of their activities in an engaging and immersive manner. Future research can delve into how these advanced technologies can further support sustainability in tourism. Integrating these tools into tourism practices could enhance transparency, engagement, and education, fostering a deeper commitment to sustainable behavior among tourists. Such exploration would pave the way for more innovative and impactful technology applications promoting PEB.

3. Emotional and Psychological Engagement

Emotions are profound elements that can foster long-term commitment to pro-environmental behavior (PEB). (Yan & Jia, 2021) highlight that the sense of awe experienced by tourists in religious tourism not only enhances biospheric values but also strengthens their desire to protect the environment. This finding aligns with the Value-Belief-Norm (VBN) Model, which underscores how deeply internalized personal values can trigger moral responsibility, ultimately driving pro-environmental actions. The emotional connection formed during such experiences amplifies the intrinsic motivations that underpin sustainable behavior.

Further emphasizing the role of emotions, (Wang et al., 2021) employ the Stimulus-Organism-Response (S-O-R) framework to demonstrate how destinations focusing on sustainability can elicit deep emotional attachment from tourists. This attachment motivates eco-friendly behavior during the trip and inspires lasting changes in habits post-travel. For example, a tourist emotionally moved by a destination's commitment to conservation may adopt more sustainable practices in their daily life, such as reducing waste or advocating for environmental causes. These findings suggest that destination managers can strategically design emotional engagement to amplify sustainability impacts. By crafting experiences that evoke awe and attachment—such as immersive natural encounters or culturally meaningful interactions—destinations can effectively drive both immediate and long-term pro-environmental behaviors. This strategic use of emotional engagement highlights its critical role as a catalyst for sustainable tourism practices.

4. Organizational and Structural Factors

At the organizational level, Green Human Resource Management (GHRM) has been identified as a strategic approach to enhancing pro-environmental behavior (PEB). (Elshaer et al., 2021) demonstrate that sustainability training programs, environmentally focused incentives, and supportive work culture can foster proactive environmental behavior among tourism employees. For example, staff trained in sustainable practices are more likely to implement eco-friendly initiatives in their workplace, such as energy conservation or waste reduction. However, a major challenge in adopting GHRM lies in its limited application among large tourism enterprises. Existing studies predominantly focus on small and medium enterprises (SMEs), while larger companies—which exert a more significant environmental footprint—frequently fail to implement similar practices. Addressing this gap is crucial for scaling the environmental impact of GHRM initiatives.

In the context of event tourism, (J. H. Han et al., 2015) highlight a notable discrepancy between eco-friendly behaviors exhibited by tourists at home and those practiced at event locations. This gap underscores the need for targeted strategies to ensure event management aligns with sustainability principles. For instance, providing on-site recycling facilities or offering incentives for attendees who opt for green transportation can encourage participants to adopt more sustainable behaviors. Such measures not only bridge the gap between intention and action but also reinforce the broader sustainability goals of

the tourism sector. These organizational and structural efforts are pivotal in institutionalizing sustainability within the tourism industry. However, to maximize their impact, there is a pressing need for broader adoption across different scales of operations and innovative strategies tailored to diverse tourism contexts, such as events and corporate initiatives. This highlights the importance of integrating organizational-level interventions with broader sustainability frameworks to create a lasting positive impact.

5. Rural Tourism and Destination Image

   Rural tourism presents unique challenges and opportunities in the context of sustainability. (Rao et al., 2022) emphasize that destination image and the relationship between tourists and local communities play a significant role in encouraging environmentally friendly behaviors, both on a personal level (e.g., waste reduction) and at a community level (e.g., participation in conservation projects). However, the success of these strategies often hinges on the local community's ability to adapt to tourism demands without compromising ecological integrity. For instance, a well-maintained balance between preserving the natural environment and accommodating tourist activities can enhance environmental conservation and visitor satisfaction.

   One of the primary challenges in rural tourism is achieving a balance between local economic needs and environmental preservation. Community-based tourism (CBT) has proven effective in empowering local communities, as it fosters direct involvement in decision-making and ensures that economic benefits are equitably distributed. Despite its potential, CBT programs often face obstacles such as limited technical capacity and insufficient access to funding. These barriers can hinder such initiatives' scalability and long-term success, particularly in regions with underdeveloped infrastructure or limited tourism resources.

   To address these challenges, a collaborative approach is essential. Governments, private sectors, and local communities must work together to build a sustainable tourism ecosystem. For example, government policies can provide financial incentives and technical support for CBT programs, while private-sector partnerships can offer training and market access. Meanwhile, local communities must be actively involved in designing and managing tourism activities to ensure their cultural and environmental values are respected. By fostering collaboration and addressing the specific challenges of rural tourism, stakeholders can create a model that promotes economic growth and safeguards environmental and cultural heritage. This dual focus is essential for ensuring the long-term sustainability of rural tourism destinations.

*Research Gaps and Future Opportunities*

Despite the significant contributions of existing literature on pro-environmental behavior (PEB) in tourism, several research gaps remain unexplored. Identifying these gaps is crucial to providing direction for future studies, ensuring that sustainability strategies in tourism continue to evolve in a relevant and contextual manner.

1. Advanced Technology Integration:

   Research on AI-based chatbots and social media has demonstrated significant potential in fostering pro-environmental behavior (PEB). These tools enhance awareness, facilitate decision-making, and create social norms promoting sustainable tourism practices. However, exploring advanced technologies like blockchain, augmented reality (AR), and virtual reality (VR) remains limited, leaving a significant gap in leveraging their potential to support sustainability in tourism. Blockchain technology, for instance, allows tourists' carbon footprints to be tracked in real-time, providing enhanced transparency in travel choices. This feature allows tourists to make informed decisions that align with their environmental values. Moreover, blockchain can be integrated into destination management systems to monitor and certify eco-friendly practices, creating accountability for tourists and service providers.

   Similarly, AR and VR present innovative opportunities to engage tourists meaningfully. These technologies can simulate immersive virtual experiences that educate tourists about the environmental impact of their activities before they embark on their trips. For example, a virtual walkthrough of coral reefs affected by climate change could evoke emotional responses that inspire more sustainable choices during their travels. These tools also have the potential to gamify sustainability education, making it more interactive and engaging for diverse audiences. The limited application of these advanced technologies highlights the need for more innovative approaches to tourism sustainability. Future research should investigate how these technologies can be effectively implemented to encourage PEB. Integrating blockchain, AR, and VR into sustainable tourism strategies could unlock new possibilities for achieving environmental goals while enriching the tourist experience.

2. Geographic and Cultural Diversity:

   The majority of analyzed studies on pro-environmental behavior (PEB) in tourism originate from Asia (42%) and Europe (25%), while North America (17%) and Africa (8%) remain underrepresented. This uneven geographical distribution highlights a significant gap, particularly in regions like Africa, which has exceptional biodiversity and substantial potential for community-based tourism. The limited research from Africa suggests underlying challenges such as restricted access to funding, inadequate research infrastructure, and a lack of international collaboration. These barriers hinder exploring how local values, cultural practices, and ecological contexts influence PEB in these regions.

   Expanding research in underrepresented areas like Africa is essential to provide critical insights into the interplay between local cultural values and sustainable tourism practices. Such studies could reveal unique strategies for promoting PEB tailored to these regions' specific social, economic, and environmental conditions. For instance, understanding how African community-based tourism initiatives align with traditional ecological knowledge could inform more inclusive and effective sustainability frameworks.

   Addressing this geographical imbalance requires collaborative efforts between researchers, governments, and international organizations. Partnerships aimed at enhancing funding accessibility, strengthening research infrastructure, and fostering cross-border collaborations could unlock the potential for impactful studies in these regions. By bridging this gap, the global understanding of PEB in tourism would become more comprehensive and contextually relevant, supporting the development of sustainable practices that resonate across diverse destinations.

3. Behavioral Consistency:

   Many studies highlight a significant discrepancy between tourists' pro-environmental behavior at home and during travels. (J. H. Han et al., 2015; Solberg & Smiley, 2022) found that while tourists often have good intentions to act sustainably, limited access to information or sustainable facilities frequently hinders the implementation of such behavior when traveling. For example, the lack of recycling facilities or low-emission transport options at destinations can discourage tourists from adhering to their usual eco-friendly practices. This inconsistency underscores the need for a deeper understanding of the factors influencing behavioral continuity. Key elements to explore include the interaction between social norms, perceptions, and destination infrastructure. Social norms at home, where environmental conservation may be widely encouraged, may not translate effectively to a travel context, particularly if the destination lacks visible support for sustainable actions. Additionally, tourists' perceptions of ease or difficulty in accessing sustainable options—perceived behavioral control in the Theory of Planned Behavior (TPB)—play a critical role in bridging the intention-action gap.

   Addressing these inconsistencies requires targeted interventions, such as enhancing the availability and visibility of sustainable infrastructure at destinations, providing clear and accessible information about eco-friendly options, and fostering social norms through local campaigns or incentives. For instance, destinations could implement green certifications for accommodations or offer discounts for tourists using sustainable transportation. Further research is necessary to investigate the specific mechanisms that maintain or disrupt consistent pro-environmental behavior across contexts. This includes examining how personal motivations and external conditions interact and how interventions can be tailored to encourage tourists to maintain their eco-friendly habits throughout their travel experiences. By bridging these gaps, stakeholders can create environments that support consistent PEB, both at home and during travel.

4. Longitudinal Studies

   Most research on pro-environmental behavior in tourism relies on cross-sectional designs, which capture only a snapshot of behaviors and motivations at a specific time. While valuable for identifying immediate trends and correlations, this approach limits our understanding of the long-term impacts of interventions promoting PEB. Assessing how sustained exposure to sustainable practices influences tourists' habits beyond travel experiences is challenging without longitudinal insights. Longitudinal studies are critical for evaluating how tourist behavior evolves and determining whether sustainable travel experiences create lasting behavioral changes. For example, a tourist who engages in emotionally significant activities—such as participating in conservation projects or experiencing awe-inspiring natural landscapes at eco-friendly destinations—might develop stronger biospheric values and a deeper commitment to sustainability. However, it remains unclear whether these effects persist once the tourist returns home or how long-lasting these influences might be.

   Research questions that longitudinal studies could address include:

   - To what extent do eco-friendly travel experiences reinforce or reshape long-term attitudes and behaviors?

- How do emotional engagements, such as awe or attachment to a destination, translate into sustained pro-environmental practices?
- What interventions (e.g., follow-up communications, sustainability pledges) are most effective in maintaining environmentally friendly behaviors post-travel?

Conducting longitudinal studies would also provide insights into behavioral spillover effects, where engaging in one pro-environmental action leads to adopting additional sustainable practices over time. Understanding these dynamics is essential for designing effective and sustainable interventions that not only impact behavior during travel but also foster a lasting culture of sustainability in tourists' daily lives. By prioritizing longitudinal research, stakeholders in the tourism sector can gain a more comprehensive understanding of the mechanisms driving long-term behavioral change. This knowledge is pivotal for crafting strategies that amplify the enduring impact of sustainable tourism initiatives.

5. Interdisciplinary Perspective

Most research on pro-environmental behavior (PEB) in tourism remains rooted in narrowly focused disciplines, such as psychology or destination management. While these fields have contributed valuable insights into individual motivations and operational strategies, a more interdisciplinary perspective is essential to address the multifaceted nature of PEB. Integrating knowledge from environmental science, sociology, economics, and technology can provide a more comprehensive understanding of the factors influencing PEB and the broader impacts of sustainable tourism. For example, collaborating with environmental science and technology could lead to developing AI-based tools that engage tourists more effectively. AI-driven systems could track environmental impacts in real-time and provide personalized recommendations for sustainable travel options, bridging the gap between awareness and action. Similarly, partnerships between sociology and economics could explore the social dynamics and economic trade-offs of sustainability initiatives, shedding light on how these efforts affect local communities. Understanding these interconnections is crucial for designing policies and programs that are environmentally sound, socially equitable, and economically viable.

An interdisciplinary approach can also address the broader systemic challenges of PEB in tourism. For instance:

- Environmental science could quantify the ecological benefits of sustainable practices.
- Sociology could examine how social norms and cultural values influence tourists' behaviors.
- Economics could assess the cost-effectiveness and financial incentives needed to encourage PEB.
- The technology could provide scalable solutions to facilitate sustainability, such as blockchain for transparency or AR for education.

By breaking down disciplinary silos and fostering collaboration across fields, future research can generate holistic solutions that address the complex interdependencies of tourism and sustainability. This perspective not only enriches academic understanding but also enhances the practical applicability of research, ensuring that interventions are more inclusive, innovative, and impactful.

6. Community Engagement in Promoting Pro-Environmental Behavior (PEB)

Local communities are often pivotal in sustainable tourism, yet their role in promoting tourists' pro-environmental behavior (PEB) remains underexplored. Further research is needed to understand how empowering communities can create ecosystems that support sustainability. Community-based tourism (CBT) is a compelling example of how local involvement can enhance the sustainability of tourism practices. CBT fosters meaningful interactions between tourists and residents, providing opportunities for cultural exchange and environmental education. These interactions can raise tourists' awareness of the importance of conservation efforts and the environmental challenges host communities face. For instance, involving tourists in local conservation projects, such as reforestation initiatives or wildlife protection programs, benefits the environment and builds a deeper appreciation and responsibility among visitors.

Additionally, empowering local communities through CBT can ensure that the economic benefits of tourism are equitably distributed while minimizing environmental impacts. By placing decision-making power in the hands of local stakeholders, CBT promotes a sense of ownership and accountability for preserving natural and cultural resources. This approach not only aligns with the principles of sustainable tourism but also helps address socio-economic disparities in tourism-dependent regions. Despite its potential, several challenges hinder the broader implementation of CBT, such as limited funding, inadequate infrastructure, and a lack of technical expertise. Research should focus on identifying strategies to overcome these barriers, including:

- Building capacity through training and education for community members.

- Facilitating partnerships between governments, private sectors, and NGOs to provide financial and logistical support.
- Developing marketing platforms that highlight CBT destinations and their unique sustainability practices.

By strengthening the role of local communities in sustainable tourism, stakeholders can create a robust framework for PEB that benefits both tourists and hosts. This collaborative approach not only enhances environmental stewardship but also supports the long-term socio-economic viability of destinations.

*Synthesis and Practical Implications*

This review highlights that the dynamic interplay of intrinsic factors, extrinsic factors, technology, emotional engagement, and sociocultural contexts influences pro-environmental behavior (PEB) in tourism. Intrinsic motivations such as personal norms and moral obligations serve as primary drivers of PEB, but their success often depends on external support, including destination policies and eco-friendly facilities. Strategies that integrate these elements prove more effective in fostering sustainable behavioral changes. Technology also plays a significant role, with AI-powered chatbots and social media establishing social norms that promote PEB. However, the potential of advanced technologies such as blockchain and augmented reality (AR) remains underexplored despite their ability to enhance transparency and engagement through tools like carbon footprint tracking and immersive virtual educational experiences.

Emotional engagement is crucial to strengthen tourists' commitment to sustainability. Experiences like awe, often evoked in religious or eco-friendly destinations, enhance biospheric values and contribute to long-lasting behavioral change. Destinations designed to foster emotional connections are more successful in sustaining pro-environmental behaviors over time. Moreover, local communities and organizations play vital roles in supporting sustainable tourism. Practices like Green Human Resource Management (GHRM) improve environmental performance through staff training and sustainability-based incentives, while community-based tourism (CBT) empowers local communities and strengthens ties between tourists and hosts (Komesty Sinaga et al., 2024; Susanto et al., 2022). Despite challenges such as limited technical capacity and funding in rural contexts, collaboration between governments, private sectors, and local communities can create more sustainable tourism ecosystems.

The findings yield practical implications for various stakeholders:

- Policymakers should design incentives like discounts for green transportation and integrate technologies such as blockchain to provide transparent carbon footprint tracking.
- Destination managers can adopt interactive technologies like AR to raise awareness among tourists and create meaningful emotional experiences through culturally enriched destination designs.
- Researchers are encouraged to explore interdisciplinary approaches, conduct longitudinal studies to understand sustainability interventions' long-term impacts and expand research to underrepresented regions such as Africa and Latin America.

PEB can become a cornerstone of sustainable tourism development by fostering collaborative approaches that engage all stakeholders. This holistic and inclusive framework has the potential to address global challenges, ensuring the tourism sector evolves in a manner that is both environmentally responsible and socially equitable.

**Discussion**

The findings from this study provide a comprehensive understanding of pro-environmental behavior (PEB) in tourism, highlighting the dynamic interplay of intrinsic motivations, external structures, technological innovations, and emotional engagement. This section discusses these findings in the context of existing literature, explores their practical implications, and identifies future research directions. Intrinsic factors, such as personal norms and moral obligations, emerged as critical drivers of PEB, aligning with frameworks like the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) model. Studies by (Y. Joo et al., 2020; Raza et al., 2024) reinforce the role of subjective norms and moral obligations in shaping tourists' sustainable behaviors. However, the findings also reveal that intrinsic motivations alone are insufficient without supportive external structures. (J. H. Han et al., 2015) illustrate this gap by identifying inconsistencies in tourists' behaviors at home and on-site, emphasizing the need for robust environmental messaging and destination design.

Technological tools, such as AI-driven chatbots (Majid et al., 2024) and social media (W. Han et al., 2018), bridge the gap between awareness and action by activating personal and social norms. These tools have shown

promise in fostering consistent PEB across different contexts. However, the use of advanced technologies like blockchain and augmented reality remains limited. Future research should explore how these tools can enhance transparency, accountability, and engagement in sustainable tourism practices. Emotions, particularly awe, and attachment, foster long-term commitment to sustainable behaviors. (Wang et al., 2021; Yan & Jia, 2021) demonstrate how emotional triggers in religious and sustainability-focused destinations evoke biospheric values, amplifying tourists' pro-environmental commitments. This highlights the potential for destination managers to design emotionally engaging experiences that integrate cultural and ecological narratives.

Green Human Resource Management (GHRM) has proven effective in embedding sustainability within organizations, as shown by (Elshaer et al., 2021). However, its application remains limited to small enterprises. Expanding GHRM practices to larger tourism enterprises and event management could significantly amplify environmental performance across the sector. The findings also emphasize the importance of aligning organizational initiatives with tourists' expectations, as seen in sports event tourism (J. H. Han et al., 2015). Rural tourism presents unique challenges and opportunities for sustainability. At the same time, (Rao et al., 2022) highlight the role of destination image and relationship quality in fostering PEB; the dual demands of ecological preservation and economic development often conflict. Addressing these challenges requires strategies that balance visitor engagement with environmental stewardship, such as incentivizing community-led initiatives and promoting low-impact tourism models.

This study identifies several avenues for future research. First, Technological Advancements: Exploring the role of blockchain and augmented reality in promoting transparency and accountability in sustainable tourism practices. Secondly, cross-cultural comparisons are conducted by conducting comparative studies across underrepresented regions, such as Africa and Latin America, to enhance the generalizability of findings. Thirdly, Behavioral Consistency: Investigating strategies to bridge gaps between at-home and on-destination behaviors. Fourthly, Longitudinal Studies examine the long-term impact of interventions on PEB to determine their sustainability over time. While this study provides valuable insights, it is not without limitations. The reliance on a limited geographic scope of studies may constrain the generalizability of findings. Additionally, the analysis predominantly focuses on theoretical and empirical studies, with limited exploration of case-specific interventions. Addressing these limitations in future studies can provide a more holistic understanding of PEB in tourism.

*Conceptual Model*

The conceptual model of Pro-Environmental Behavior (PEB) in tourism demonstrates (Figure 3) how intrinsic factors, extrinsic factors, and technology collectively act as antecedents that directly influence sustainable actions by tourists. Intrinsic factors, such as personal norms, environmental awareness, and moral obligation, form the psychological foundation of PEB. These factors drive a tourist's motivation to act sustainably by shaping their intentions and values. For instance, tourists with a strong sense of environmental responsibility are likelier to adopt eco-friendly behaviors during travel. Simultaneously, extrinsic factors provide the external conditions and resources necessary to translate intentions into action. These include environmental policies, infrastructure, and incentives that create an enabling environment for sustainable practices. For example, accessible recycling facilities, incentives for using green transportation, or regulations promoting low-emission tourism make it easier for tourists to align their behaviors with their intrinsic motivations. The interplay between intrinsic and extrinsic factors ensures that internal motivations are supported by a conducive external environment, fostering consistent pro-environmental actions.

In parallel, technology functions as a powerful antecedent that independently influences PEB. Technological tools such as AI-driven chatbots, blockchain, and social media platforms enhance tourists' awareness, decision-making, and engagement with sustainability. For instance, social media amplifies eco-friendly norms by promoting sustainable travel experiences, while blockchain offers transparency by tracking carbon footprints. Furthermore, augmented reality (AR) and virtual reality (VR) provide immersive educational experiences that help tourists understand the ecological impact of their choices. Unlike intrinsic and extrinsic factors, which are more static, technology introduces dynamic and innovative solutions that strengthen the overall framework for sustainable behavior.

These antecedents—intrinsic factors, extrinsic factors, and technology—directly influence emotional engagement, which acts as a critical driver of PEB. Experiences that evoke emotions, such as awe at natural beauty or attachment to cultural heritage, deepen tourists' commitment to sustainable actions. Emotional engagement reinforces intrinsic motivations and encourages long-term behavioral shifts, extending the impact of sustainable tourism practices beyond the immediate travel context. For example, a tourist who feels emotionally connected to a destination is more likely to advocate for its preservation. The role of organizations

and local communities further supports this framework. Through initiatives such as Green Human Resource Management (GHRM) and Community-Based Tourism (CBT), organizations and communities provide structural support for PEB. These initiatives empower stakeholders and tourists to work collaboratively toward sustainability. For instance, CBT fosters meaningful interactions between tourists and locals, promoting shared responsibility for environmental conservation.

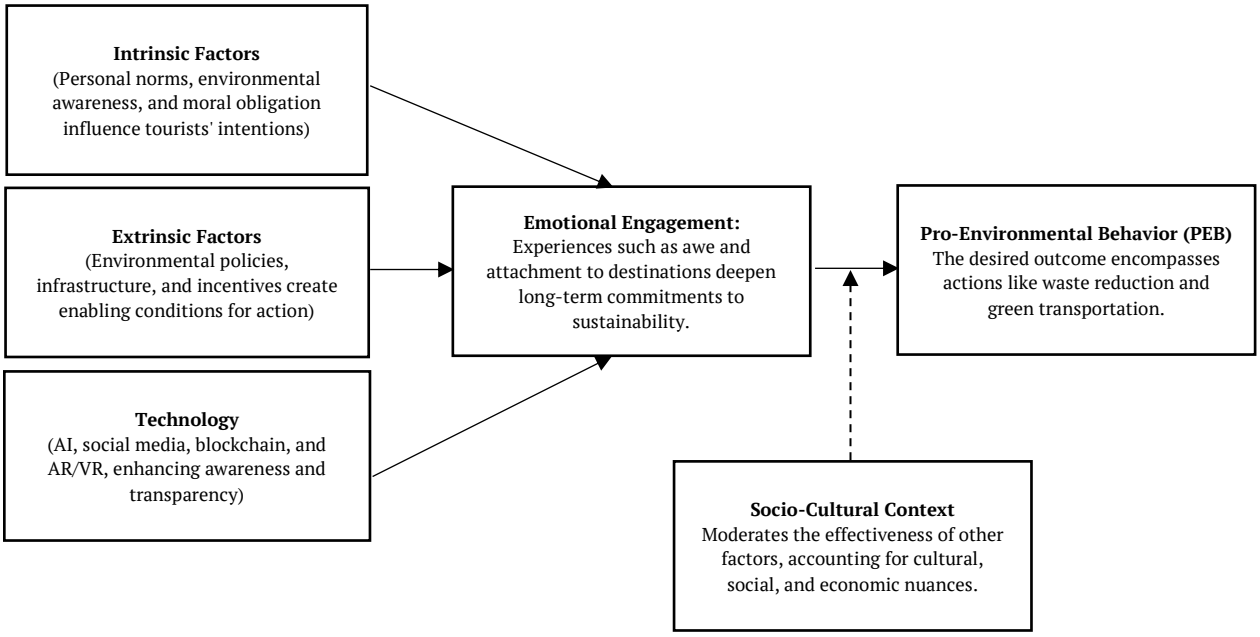


**Figure 3. Proposed Model**

Finally, the sociocultural context moderates the effectiveness of all these factors by shaping how they interact with tourists' behaviors. Cultural norms, economic conditions, and social values influence the relative importance of intrinsic, extrinsic, and technological factors. For example, in regions with strong cultural ties to nature, intrinsic motivations may dominate, while in urban areas with limited resources, technological solutions may play a more significant role. This contextual layer ensures that strategies for promoting PEB are tailored to the unique characteristics of each destination. Ultimately, these interconnected elements converge to produce Pro-Environmental Behavior (PEB), encompassing waste reduction, green transportation, and participation in conservation efforts. The model highlights the importance of a holistic approach that integrates psychological, external, technological, and emotional dimensions to drive sustainable tourism practices effectively.

## Conclusion

This study synthesizes findings from 24 peer-reviewed articles to comprehensively understand pro-environmental behavior (PEB) in tourism. The analysis reveals that PEB is shaped by the dynamic interplay of intrinsic factors (e.g., personal norms and moral obligations), extrinsic factors (e.g., destination policies and infrastructure), technological advancements, emotional engagement, and sociocultural contexts. These elements collectively influence tourists' intentions and actions toward sustainability, underscoring the complexity of promoting PEB within the tourism sector. Intrinsic motivations, such as environmental awareness and moral responsibility, drive PEB, but their effectiveness often depends on external support, such as eco-friendly infrastructure and supportive policies. Advanced technologies, including AI, blockchain, and augmented reality, have significant potential to enhance sustainability practices, yet their application in tourism remains limited. Emotional engagement, especially experiences that evoke awe or attachment to destinations, is critical in fostering long-term commitment to sustainable behavior. Furthermore, local communities and organizational practices, such as Green Human Resource Management (GHRM) and community-based tourism (CBT), provide essential structural support for integrating sustainability into tourism practices.

Despite these advancements, gaps in research and practice remain. Limited longitudinal studies hinder understanding of the long-term effects of sustainability interventions, while geographical imbalances in research, particularly in regions like Africa and Latin America, constrain global applicability. A more

interdisciplinary approach is needed to bridge these gaps, integrating insights from environmental science, sociology, economics, and technology to create holistic solutions for sustainable tourism. This review emphasizes the importance of collaborative efforts among policymakers, destination managers, researchers, and local communities to promote PEB. By leveraging technological innovations, fostering emotional engagement, and addressing sociocultural nuances, stakeholders can design strategies that encourage sustainable behavior during travel and inspire long-lasting changes beyond the travel context. Such efforts are critical to ensuring that tourism evolves as a force for environmental stewardship, social equity, and economic resilience in the face of global sustainability challenges.

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