Understanding Sustainable Tourist Behavior: A Systematic Review of Psychological, Contextual, and Technological Drivers

Heri Nurranto[1], Usep Suhud [2], Setyo Ferry Wibowo[3]

[123]Management of Science, Universitas Negeri Jakarta, Indonesia

Abstract

This systematic literature review investigates the psychological, contextual, and technological drivers of sustainable and pro-environmental tourist behavior (PEB) based on 50 empirical studies published between 2016 and 2025. Drawing on the PRISMA 2020 framework, the review synthesizes findings from four academic databases, applying thematic analysis to identify prevailing theoretical approaches, methodologies, and research trends. Results reveal three dominant themes: behavioral determinants (e.g., values, awareness), destination attachment and image, and the role of emerging technologies such as virtual reality and metaverse platforms. Despite a surge in research, gaps remain in longitudinal data, geographic diversity, and real-world behavioral measurement. The study proposes future research directions emphasizing interdisciplinary approaches and the integration of digital innovations to foster environmentally responsible tourism behavior.

Keywords: Sustainable tourism, Pro-environmental behavior, Tourist behavior, Systematic literature review, Green marketing

1. Introduction

The tourism sector serves as a crucial catalyst for global economic growth (Bulut et al., 2021; Elgin & Elveren, 2024). However, this rapid expansion has also brought about detrimental impacts on the ecological environment, including rising carbon emissions, habitat disruption, and the overuse of natural resources (Baloch et al., 2023; Wang & Cheablam, 2025). Today, the world faces escalating environmental challenges such as climate change, pollution, biodiversity loss, and resource degradation, which demand urgent conservation responses (Osorio-Molina et al., 2023). Consequently, sustainable tourism has emerged as a guiding principle, aiming to balance economic benefits with environmental responsibility, cultural preservation, and local community well-being.

Central to the realization of sustainable tourism is the behavior of the tourists themselves. A growing body of literature highlights the role of Pro-Environmental Tourist Behavior (PEB)—also termed Environmentally Responsible Behavior (ERB) or Sustainable Tourist Behavior (STB)—as a crucial element in tourism sustainability (Prawira et al., 2024; Feng et al., 2024). ERB refers to individual actions by tourists that minimize environmental harm, promote the responsible use of natural and built environments, and support ecological conservation during travel (Wang & Cheablam, 2025; Zhang et al., 2024). Encouraging such behavior is considered vital for advancing the sustainability of tourist destinations (Ye et al., 2022).

These behaviors span a broad range—from general actions such as reducing energy usage and recycling, to specific activities like adhering to rules in ecologically sensitive areas, avoiding over-packaged products, picking up litter, or supporting local enterprises that value cultural and environmental integrity (Feng et al., 2024; Prawira et al., 2024). Given its complexity and variability across contexts, Pro-Environmental Tourist Behavior warrants comprehensive and systematic investigation within the scope of tourism sustainability research. Previous studies have drawn on various theoretical frameworks, most notably the Theory of Planned Behavior (TPB) and the Value-Belief-Norm (VBN) theory, to explain the drivers of tourists' sustainable intentions and actions (Filimonau et al., 2022; Roy, 2023). However, the literature remains fragmented, dominated by quantitative methods, and often lacks integration with technological, experiential, and ESG (Environmental, Social, and Governance) value dimensions (Vicente, 2024; Y. Yang et al., 2025; Yawised & Apasrawirote, 2025).

Despite the abundance of empirical studies on sustainable tourist behavior, fragmented approaches and a lack of theoretical integration often hinder comprehensive understanding. This review stands out by offering a consolidated perspective that bridges individual psychological factors, technological innovations, and sociocultural contexts. In doing so, it responds to the growing need for research that not only identifies behavioral determinants but also explains how these are influenced by evolving digital landscapes and participatory community frameworks. Therefore, this systematic review aims to guide both academic and policy-level interventions toward fostering environmentally responsible tourist behavior.

What sets this review apart is its integrated lens combining behavioral psychology, technological evolution, and socio-cultural engagement in a single framework. Unlike previous SLRs that often focus solely on theory testing or intention modeling, this study bridges intention and action, theory and technology, and policy and practice in pro-environmental tourism behavior. This systematic review aims to synthesize empirical findings related to sustainable tourist behavior by highlighting key psychological, social, technological, and perceptual factors. Additionally, the study addresses gaps in the literature and proposes future research directions that emphasize interdisciplinary integration and contextual understanding. To achieve these objectives, the review is guided by the following research questions:

1) RQ1: What are the key psychological, social, and contextual determinants of pro-environmental tourist behavior (PEB) as discussed in the empirical literature from 2016 to 2025?
2) RQ2: What theoretical frameworks and methodological approaches have been most commonly applied in the study of sustainable tourist behavior?
3) RQ3: What are the dominant research trends, geographical distributions, and topical focuses in the existing body of work?
4) RQ4: What research gaps and future directions can be identified to advance a more integrative and context-sensitive understanding of PEB in tourism?

To address these questions, the following section outlines the systematic review methodology applied in this study. This review contributes to the literature by offering a synthesis that not only updates existing insights but also integrates psychological, contextual, and technological dimensions of tourist behavior. Unlike previous reviews that often focus narrowly on one theoretical model or demographic, this study bridges diverse perspectives and methodologies to present a holistic understanding. Furthermore, by including literature up to 2025, this review offers the most recent mapping of trends, including underexplored innovations such as metaverse tourism and gamification strategies in sustainability efforts.

This systematic literature review contributes to the evolving discourse on sustainable tourism behavior by offering an integrated framework that encompasses psychological,

contextual, and technological drivers. Unlike previous reviews that tend to focus on either behavioral models or technological innovations in isolation, this study combines these perspectives within a cohesive analysis. The novelty of this review lies in its coverage of post-pandemic digital transformation (e.g., AI, VR, and metaverse tourism), its focus on diverse theoretical hybrids, and its inclusion of underrepresented empirical insights from Southeast Asia. By analyzing 50 empirical studies from 2016 to 2025, this SLR not only maps current knowledge but also identifies future research directions that encourage interdisciplinary collaboration, inclusive data practices, and evidence-based policy development.

2. Methodology

This study adopts a systematic literature review (SLR) methodology, guided by the PRISMA 2020 framework to ensure a structured, transparent, and replicable process for identifying and synthesizing empirical research on sustainable and pro-environmental tourist behavior (Page et al., 2021). The review covers studies published between 2016 and 2025, capturing the surge in sustainability-focused tourism research following the launch of the post-2015 Sustainable Development Goals (Li et al., 2024). This timeframe also aligns with a period of significant technological, societal, and behavioral shifts in tourism, particularly driven by post-pandemic recovery strategies and digital innovation. Thus, the 2016–2025 range ensures the inclusion of the most contextually relevant, transformative, and up-to-date findings

The review draws on four principal academic databases: ScienceDirect, MDPI, Emerald Insight and Google Scholar. The inclusion of Google Scholar complements the formal databases by capturing gray literature and emerging studies not indexed elsewhere (Haddaway et al., 2015). Search keywords included “sustainable tourist behavior”, “pro-environmental tourism intention”, “eco-friendly travel behavior”, combined with Boolean operators (AND, OR, NOT) to refine results. Figure 1 presents the PRISMA 2020 flow diagram used in this study, adapted to align with the screening and eligibility procedures applied.

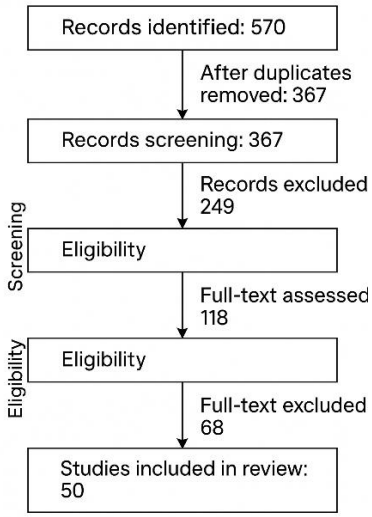

Figure 1. PRISMA 2020 flow diagram illustrating the article screening process

We selected four databases—ScienceDirect, MDPI, Emerald Insight, and Google Scholar—to ensure comprehensive coverage. Notably, Google Scholar was included to access grey and emerging literature not always indexed in traditional databases (Haddaway et al., 2015). Search keywords included “sustainable tourist behavior”, “pro-environmental tourism intention”, “eco-friendly travel behavior”, combined with Boolean operators (AND, OR, NOT)

to refine results. Inclusion criteria were: (1) empirical studies (quantitative, qualitative or mixed-methods) published in English between 2016–2025; (2) focusing explicitly on tourism-related behaviors with an environmental or sustainability orientation; (3) peer-reviewed journal articles indexed in the selected databases. Exclusion criteria comprised conceptual papers without empirical data, studies outside the tourism domain, and duplicate publications across databases.

The screening process was conducted in three phases: title and abstract review, full-text review, and eligibility confirmation. A total of 50 articles met the criteria and were retained for analysis. Data extraction was performed manually using Microsoft Excel, where a thematic matrix was developed. This matrix captured key elements such as author, year, study location, research method, theoretical framework, core variables (independent, dependent, mediating/moderating), and major findings**.** The extracted data enabled thematic clustering based on behavioral drivers, theoretical underpinnings, and outcome patterns. This approach followed a general inductive logic, which is commonly applied in qualitative synthesis of empirical findings (Thomas, 2006).

To ensure the credibility and robustness of findings, the methodological quality of the 50 included studies was also assessed based on their research design, sampling techniques, and statistical rigor. Most studies demonstrated high validity through robust use of Structural Equation Modeling (SEM), clear theoretical grounding, and appropriate sample sizes. However, some limitations were noted, such as reliance on self-reported data, lack of triangulation, and regional homogeneity. These factors may affect the generalizability and reliability of certain conclusions, underscoring the need for more diverse and rigorously designed research in the future.

To enhance transparency and replicability, a detailed matrix was developed to code each article's theoretical basis, variable relationships, and empirical context. Inter-rater reliability was maintained through cross-validation of extracted data. Furthermore, each study's methodological rigor was rated on three criteria: theoretical alignment, statistical robustness, and contextual relevance. This enabled a quality-informed synthesis that prioritizes both conceptual clarity and practical applicability. Although no formal critical appraisal tools were applied, triangulation and pattern matching enhanced internal validity.

3. Results and Findings

To synthesize theoretical orientations in sustainable tourist behavior studies, a summary table of the reviewed articles is presented below.

3.1. Theoretical Frameworks

Table 1 serves as the foundational matrix from which all analytical themes in this review are derived. The inclusion of author names, theories, methods, and key variables ensures consistency between textual discussions and empirical data. This table functions not only as a descriptive catalog but also as an analytical tool that supports pattern identification across theoretical frameworks, study contexts, and methodologies.

The Theory of Planned Behavior (TPB) was the most dominant framework, utilized in over half of the reviewed studies to explain pro-environmental intentions and behaviors among tourists. For example, Lin et al. (2025) integrated TPB with value–attitude–behavior (VAB) and value–intention–process (VIP) models to predict sustainable behavior among visitors to Jeju Island. Similarly, Zhang et al. (2022) applied TPB and the Norm Activation Model (NAM) to understand tourists' environmentally responsible intentions in forest trail contexts.

The Norm Activation Model was also employed in Gomes & Lopes (2023) to highlight the influence of personal norms and awareness of consequences on responsible tourism. Emerging theoretical perspectives have also gained traction. Sarmento & Loureiro (2021) extended TPB with habit theory to explore how habitual and normative factors shape behavioral intention in robotic tourism.

The Value–Belief–Norm (VBN) framework underpinned (Stern, 2000), forming the conceptual foundation for multiple later works emphasizing moral obligation and environmental values. Meanwhile, An et al. (2024) adopted mindfulness theory to assess how mindful awareness and emotional solidarity influence environmentally responsible behavior in urban tourism.

In addition Chi & Giao (2024) and Soulard & Russell (2025) utilized destination image and cognitive–affective theories to investigate how tourists' perceptions of emotional and cognitive value influence loyalty and behavioral intentions. These studies highlight the integration of psychological dimensions in understanding sustainable tourist behavior, reflecting a broader shift toward multi-dimensional theoretical models in tourism research. Future research is encouraged to adopt hybrid frameworks that combine cognitive, emotional, habitual, and contextual factors to better capture real-world behaviors. A comprehensive summary of the theoretical frameworks, study contexts, and methodological approaches used in the 50 selected articles is presented in **Table 1**. This table functions as the core reference for ensuring consistency in citation and thematic analysis throughout the review.

In recent years, scholars have increasingly sought to integrate classical behavioral theories like TPB and VBN with emerging constructs such as mindfulness, emotional solidarity, or destination attachment. For example, An et al. (2024) applied mindfulness theory to enhance voluntourism, while Chi & Giao (2024) employed emotional value to explain tourist loyalty. These theoretical hybrids reflect a growing recognition that tourist behavior is shaped not only by rational deliberation, but also by affective, experiential, and social dimensions. Future research should further explore the synthesis of these diverse theoretical lenses to enrich the explanatory power of pro-environmental tourist behavior models.

Table 1. Summary of Theories Used in the Reviewed Studies

No	Author(s), Year	Theory Used	Study	Key Variables	Method
1	Zhang et al., 2022	TPB, NAM	China	ERB, TPB variables	SEM
2	Sahabuddin et al., 2021	Relationship Quality	Bangladesh	ERB, Satisfaction	PLS-SEM
3	Xue et al., 2020	M-R Model	Taiwan	Pro-env. behavior, Loyalty	LISREL
4	Wut et al., 2023	TPB (Review)	Global	Attitude-intention gap	Review
5	Sarmento & Loureiro, 2021	TPB, VBN	Portugal	Norms, Habits	PLS-SEM
6	Rafiq et al., 2022	Positive Psychology	USA	Dispositional Optimism	PLS-SEM
7	Hu & Sung, 2022	Place Attachment	Taiwan	Emotions, Attachment	SEM
8	Lin et al., 2025	VIP, VAB, TPB	South Korea	TERB, Values	SEM, fsQCA
9	Gomes & Lopes, 2023	Sustainable Info Model	EU	Habits, Information	PLS-SEM
10	Kim et al., 2018	Affect-Cognition	South Korea	Knowledge, Affect	SEM

11	Marios Sotiriadis et al., 2025	Social Marketing	China	Behavior Intention	PLS-SEM
12	Elshaer et al., 2024	VBN Theory	Mesir	Awareness, Norms	PLS-SEM
13	Bali´nska et al.,2024	TPB	Poland	ERB, Attitude	SEM
14	Dias et al., 2021	N/A	Portugal	Responsibility Index	Psychometrics
15	Lu Yang et al., 2023	Authenticity Theory	China	Experience, Trust	SEM
16	Dini et al., 2023	Place Attachment	Italia	Place Identity	SEM Amos
17	Zhang and Lo, 2024	Cognitive-Affective	Taiwan	Destination Image	SEM Amos
18	Nguyen & Duong, 2024	Emotion Theory	Vietnam	Nostalgia, PEB	SEM Amos
19	Maroto et al., 2023	Norm Activation	Spain	Personal Norms	PLS-SEM
20	Wan & Lau, 2021	Value-Attitude	China	Attitude, Value	SEM &MGA
21	Aykol et al., 2021	Emotion-Attachment Theory	Turkiye	Emotion, Attachment, Revisit	Pls-SEM
22	Reverte et. Al., 2023	MTE Model	Spain	MTE, ERB	SEM Amos
23	Wang & Wu., 2023	SOR Framework	South Korea	Presence, Emotion, Response	SEM
24	Singh, Lee, Tsai, 2025	Engagement Theory	-	STT Attributes, Engagement, Place Attachment	SEM
25	Klarin et al., 2023	Sustainability Framework	Global	Transformation, Systems	Scientometric
26	Jamilena et al, 2024	Co-Creation, Slow Tourism	Spain	Sustainability Perception	SEM
27	Yang, Li, Qu, 2025	Groundedness Theory	China (urban tourists)	AI Accent, PEB Intention, Groundedness	4 Studies (Experimental)
28	Yawised & Apasrawirote, 2025	MTME Framework	Global	Immersion, ESG, SDGs, Interactivity	Literature Review
29	Manthiou, Klaus, Luong, 2022	Pragmatism, Slow Tourism Continuum	Global/Online	Slow Tourism, Practice Gap, Definition	Leximancer Text Mining
30	Mahato, Phi, Prats, 2021	Design Thinking Framework	Vietnam	Social Innovation, Design Thinking, Intuition	Case Study
31	An, Eck, Woosnam, Jiang, 2024	Mindfulness Theory	China	Mindfulness, Emotional Solidarity, Destination Loyalty	SEM
32	Jin & Lee, 2022	Cognitive-Affective	South Korea	Value, Loyalty	Case Study
33	Kim et al., 2022	Presence Theory	South Korea	Presence, Attitude	SEM
34	Filimonau al., 2022	TPB	Polandi	Attitude, Intention	SEM
35	Vicente, 2024	Green Behavior Theory	Indonesia	Environmental Concern	SEM

36	Sianipar et al., 2025	Community Engagement Model	Indonesia	Strategies, Engagement	Case Study
37	Suriyankietkaew et al., 2023	Creative Tourism Theory	Thailand	Innovation, Development	Qualitative
38	KIZILDAĞ et al., 2022	Environmental Concern	Turkiye	Concern, Participation	SEM
39	Kumar Roy et al., 2023	Green Behavior	Bangladesh	Knowledge, ERB	SEM
40	Chi & Giao, 2024	Cognitive-Affective	Vietnam	Image, Value, Revisit	SEM
41	Huang & Liu, 2017	TPB	Taiwan	Evvironmen Concern, Destination image	SEM
42	Dwivedi, et al., 2023	TPB	India	Attitude, Intention	SEM
43	Kim & Gray, 2025	Environmental Communication	USA	Message Framing, PEB	Experiment
44	Šimková et al, 2023	Environmental Education	Ceko	Awareness, Education	Mixed Methods
45	Stern, 2000	Value-Belief-Norm	Global	VBN, Values	Theoretical
46	Liu et al., 2021	Green Innovation	China	Policy, Innovation	Regression
47	Herrera et al, 2025	Sustainability Theory	Spain	Indicators, Policy	SEM
48	Kılıç & Demir 2022	Destination Branding	Turkiye	Brand Image, Intention	SEM
49	Luekveerawattana et al., 2025	Tourist Perception Theory	Thailand	Impact, Perception	SEM
50	Gopal, 2023	Community-Based Tourism	India	Engagement, Empowerment	Review

3.2. Geographical and Demographic Trends

The geographical distribution of studies on environmentally responsible tourist behavior reveals a strong concentration in East and Southeast Asia, particularly in China, South Korea, and Indonesia. These countries appear frequently in empirical investigations, driven by their growing domestic tourism sectors and increasing governmental or academic interest in sustainability. For instance, Zhang et al. (2022) explored tourists' environmentally responsible behavior on forest trails in China by integrating TPB and NAM. Similarly, Chi & Giao (2024) applied mindfulness theory in the context of urban tourism to examine sustainable behavioral outcomes. In South Korea, Chi & Giao (2024) investigated how destination image and emotional value influence travelers' revisit intentions. These findings reflect a regional focus on cognitive and affective drivers of sustainable travel.

European studies, such as those by Gomes & Lopes (2023) in Spain and Portugal, expand the scope by applying models like the Norm Activation Model and creative tourism frameworks to understand eco-conscious behavior and cultural sustainability. Meanwhile, Indonesia is increasingly featured in research, particularly in studies focusing on environmental concern and tourist engagement. Bulut et al. (2021) investigated green tourism participation intentions among Indonesian domestic travelers, and (Luekveerawattana et al., 2025) assessed how tourists' perception of economic, cultural, and environmental factors influence tourism sustainability in rural areas.

In contrast, representation from other parts of the Global South, particularly Africa and parts of Latin America, remains limited in the reviewed literature. This gap suggests a need for broader geographical inclusion, especially considering the tourism growth potential and

ecological sensitivity in these regions. Additionally, while demographic-specific studies (e.g., focused on Gen Z or gender) exist globally, they are still underexplored in the reviewed Southeast Asian and African contexts.

To address the geographic concentration in Asia and Europe, future research should prioritize cross-regional comparisons and partnerships with local researchers in underrepresented regions such as Africa, Latin America, and the Pacific Islands. These areas often face acute environmental challenges while possessing rich tourism potential. Initiatives supported by international collaborations and funding bodies like the UNWTO or UNEP could foster inclusive data generation and amplify local voices in sustainable tourism research.

3.3. Types of Research Methods

Quantitative research methods dominate the methodological landscape of environmentally responsible behavior (ERB) studies in tourism. Among them, Structural Equation Modeling (SEM) and its extensions such as Partial Least Squares SEM (PLS-SEM) are most prevalent due to their robust capacity to test complex theoretical models involving multiple latent variables. Studies such as Gomes & Lopes (2023) and Luekveerawattana et al., (2025) effectively applied these techniques to examine relationships between personal norms, perceptions, and sustainability behavior in various tourism contexts. These methods allow researchers to statistically validate constructs like intention, attitude, and perceived behavioral control, offering high predictive accuracy.

In addition to SEM, some studies explored fuzzy-set Qualitative Comparative Analysis (fsQCA) to reveal multiple causal pathways, particularly in configurations involving values, attitudes, and behavioral patterns. Lin et al. (2025), for example, used fsQCA to understand the interplay of value systems and personal norms in tourists' environmentally responsible behavior on Jeju Island. While these quantitative models provide generalizable insights, they often overlook the subjective experiences and socio-cultural dynamics that underlie behavior.

In contrast, qualitative and mixed-method approaches remain underrepresented in the literature. Only a handful of studies, such as Sianipar et al. (2024), utilized case studies and interviews to explore the role of community engagement and adaptive strategies in Malaysian ecotourism development. Such methods can yield rich, context-specific understanding and offer complementary perspectives often missing from statistical models.

Another recurring methodological limitation is the overreliance on behavioral intention rather than actual observed behavior. Most reviewed studies measured respondents' willingness to act sustainably rather than capturing real-life practices during or after their travel. This intention–behavior gap, while widely acknowledged, continues to limit the ecological validity of findings and hampers their practical applicability. Therefore, future research would benefit from longitudinal designs, behavioral observation, and triangulation to capture the complexity of tourist decision-making and action.

Despite the strong reliance on behavioral intention models, few studies attempt to track or measure actual environmentally responsible behaviors. While intentions are useful predictors, they do not always translate into real actions. This "intention–behavior gap" poses a serious challenge to ecological validity. Future studies should consider adopting longitudinal methods, observational techniques during travel, or digital tracking (e.g., app-based logging or geolocation data) to capture real-time behaviors. For example, integrating experience sampling methods (ESM) or post-trip follow-ups can offer a more accurate understanding of behavior change processes over time.

To address the persistent intention–behavior gap, future studies could incorporate longitudinal panel data, behavioral tracking, or app-based observational tools during and after travel experiences. For example, employing experience sampling methods (ESM) or post-trip follow-ups may capture the actual evolution of sustainable behaviors over time. Such

methodological expansion would not only enhance ecological validity but also help tourism managers design better-targeted interventions based on verified actions rather than self-reported intentions.

3.4. Research Themes

Recent studies in sustainable tourism behavior increasingly reflect emerging societal, technological, and ecological priorities. One key trend is the emphasis on slow tourism and co-creation experiences, which advocate for deeper local engagement and reduced environmental impact. For example, Frías-Jamilena et al. (2024) analyzed how building a "slow destination" image can influence tourists' sustainability perceptions, while Manthiou et al. (2022) proposed a slow tourism continuum derived from travel vloggers' narratives.

Another major development involves the integration of smart technologies such as Artificial Intelligence (AI), gamification, and immersive experiences. Singh et al. (2025) showed that smart tourism technologies enhance visitor engagement and foster place attachment, particularly when gamification is used as a moderating factor. Yawised & Apasrawirote (2025) further demonstrated how immersive metaverse-based marketing aligns with environmental, social, and governance (ESG) goals in virtual tourism ecosystems.

Lastly, community involvement and environmental education are gaining importance. Sianipar et al. (2024) explored how adaptive strategies and community participation promote ecotourism sustainability in Malaysia. Similarly, Šimková et al. (2023) highlighted the role of tourist education in enhancing environmental responsibility during travel. These themes reflect a shift toward inclusive, tech-enabled, and educational strategies for promoting environmentally responsible behavior in tourism.

4. Dicussion

4.1. Synthesis of Thematic Insights

The synthesis in this section is grounded in the structured data extracted from the 50 reviewed studies, which are detailed in **Table 1**. To avoid ambiguity, all in-text citations directly correspond to the sources listed in this master table, ensuring the integrity and traceability of all findings discussed. The review reveals five dominant thematic clusters. First, the majority of studies emphasize intention to act pro-environmentally, mostly based on TPB and related behavioral models. Constructs such as attitude, subjective norm, and perceived behavioral control consistently predict behavioral intention (M.-S. Kim et al., 2018; Zhang et al., 2022). Second, the role of perceived destination image and emotional value emerges prominently. Destinations that are seen as authentic, environmentally friendly, and emotionally resonant are more likely to attract responsible tourists (Chi & Giao, 2024; Dini et al., 2023).

Third, technological advancement has emerged as a new dimension, with smart tourism technologies, gamification, and AI integration influencing sustainability-related attitudes and place attachment (e.g., (Singh et al., 2025; Yang et al., 2025). Fourth, research has increasingly recognized the role of community involvement and environmental education in reinforcing sustainable practices, both for residents and tourists (e.g., Gopal, 2023; Šimková et al., 2023). Lastly, concepts such as slow tourism and immersive experiences indicate a shift toward more meaningful, culturally engaged, and environmentally conscious travel (e.g., Manthiou et al., 2022; Klarin et al., 2023).

Moreover, the integration of Environmental, Social, and Governance (ESG) principles is gaining traction, particularly in studies exploring digital tools and smart tourism. These tools align with ESG priorities by promoting transparency, sustainability, and stakeholder engagement. For instance, studies leveraging AI-driven personalization, VR simulations, and gamified applications not only enhance user experience but also support ESG-aligned messaging and behavioral nudging. This intersection between ESG frameworks and

technological innovation represents a promising yet underdeveloped area that merits deeper investigation in future sustainable tourism research.

Collectively, these five thematic areas not only reflect the current intellectual landscape of sustainable tourism behavior but also highlight an evolving need for integrative models. For instance, while TPB continues to dominate intention-based research, emerging themes such as technology adoption and community participation indicate a paradigm shift toward more holistic, experience-based perspectives. This calls for a balanced synthesis of psychological, technological, and socio-cultural dimensions in future studies.

4.2. Identified Research Gaps

Despite thematic diversity, several gaps persist. Most notably, studies still emphasize behavioral intention over actual behavior, perpetuating the intention-behavior gap ((Zhang et al., 2022; Balińska et al., 2024). Additionally, variables such as emotions, mindfulness, and cultural values are underutilized as mediators or moderators, though they show potential in enhancing model precision (An et al., 2024; Nguyen & Duong, 2025). Experimental and longitudinal studies are rare, limiting the ability to draw causal inferences (Singh et al., 2025). Finally, there is a geographical bias, with most studies conducted in East and Southeast Asia or Europe, while regions like Africa and Latin America remain underrepresented, calling for more inclusive global perspectives (Gomes & Lopes, 2023; Luekveerawattana et al., 2025).

Future research should explore hybrid frameworks that incorporate emotional, habitual, and value-based constructs, especially within immersive technology settings like the metaverse. Combining observational methods with real-time digital data (e.g., geolocation, app logs) could close the intention-behavior gap and offer more granular behavioral insights. Moreover, partnerships with tourism stakeholders across underrepresented regions such as Africa, Latin America, and the Pacific could diversify data sources and foster inclusive innovation in sustainability practices.

This review is not without limitations. First, the focus on studies published in English may have excluded relevant literature in other languages, especially from Latin America and Africa. Second, despite efforts to ensure comprehensiveness, reliance on Google Scholar and selected databases may have led to omission of certain non-indexed or emerging sources. Finally, the review did not apply formal quality appraisal tools such as the CASP checklist or AMSTAR, which may be addressed in future meta-analyses. These limitations highlight the need for continuous updates and triangulated approaches in synthesizing tourism behavior literature

To address these limitations, future reviews may benefit from including multilingual search strategies, broader inclusion of regional databases (e.g., Scielo, AJOL), and formal methodological appraisal tools like AMSTAR or CASP. Employing AI-assisted screening and coding tools may also improve consistency and efficiency in future SLR processes. Moreover, future SLR efforts may benefit from adopting meta-analytic techniques or structured critical appraisal tools such as AMSTAR or CASP. These instruments help standardize the assessment of methodological quality, reduce subjective bias, and ensure reproducibility of synthesis results. Incorporating AI-assisted tools for article screening, coding, and quality rating can also enhance transparency and scalability in future reviews.

4.3. Practical Implications

The findings offer actionable insights for multiple stakeholders. Policymakers and tourism managers should adapt environmental campaigns to address demographic and cultural differences**,** especially among female travelers and Gen Z**,** who are increasingly associated with sustainability values and digital fluency (Balińska et al., 2024). Community-based strategies**,** such as involving residents in sustainable tourism planning and co-creating experiences**,** can

enhance local ownership and long-term commitment (Sianipar et al., 2024). Moreover, digital tools, including AI-powered chatbots**,** VR platforms**,** and smart tourism technologies, offer scalable means to influence tourist behaviors and attitudes by personalizing messages and enhancing engagement (Singh et al., 2025). Researchers and NGOs can support these efforts by designing and testing behavioral interventions grounded in theoretical models and adapted to specific regional or cultural contexts.

For instance, in Indonesia, several studies have explored the integration of community involvement in tourism management in areas like Komodo and Bandung. These initiatives have not only enhanced environmental outcomes but also improved economic equity. Similarly, smart tourism projects in South Korea demonstrate how mobile apps and STTs can guide tourists toward eco-friendly choices, such as green transport or low-impact attractions. Embedding these practical models within policy and educational tools will be essential to scale sustainable tourism.

4.4 Synthesis of Thematic Findings

Analysis of the 50 selected articles reveals five recurring themes in the study of pro-environmental behavior among tourists. The most dominant theme is the intention to act sustainably, often explored through the Theory of Planned Behavior (TPB) and its extensions. Variables such as attitude, subjective norm, and perceived behavioral control consistently emerge as significant predictors of intention (Zhang et al., 2022; Balińska et al., 2024).

The second theme centers on perceived destination image and emotional value, where studies highlight how environmental attributes, perceived authenticity, and emotional attachment influence tourists' preferences for sustainable destinations (M.-S. Kim et al., 2018; Dini et al., 2023). This is closely followed by a growing focus on technology and digital innovations, with studies examining how AI tools, VR, and smart tourism technologies (STTs) can shape environmental attitudes and behavior through personalized and immersive experiences (Singh et al., 2025; Yang et al., 2025).

Another key theme is the role of local communities and environmental education in shaping tourist behavior. Research emphasizes the importance of community participation, education programs, and local empowerment in fostering environmentally responsible practices (Šimková et al., 2023; M. Kim & Pennington-Gray, 2025). Finally, emerging themes like slow tourism and co-creation reflect a shift toward value-based, meaningful travel. These approaches advocate for deep cultural immersion, slower travel rhythms, and collaborative destination experiences (Manthiou et al., 2022; Yawised & Apasrawirote, 2025).

The themes identified in this synthesis suggest an ongoing shift in the field—from purely intention-based behavioral studies toward more interdisciplinary and technology-integrated approaches. However, to fully capture the complexity of sustainable tourism behavior, future research must integrate these insights into unified theoretical models. This integrative direction can provide both scholars and practitioners with deeper, actionable understanding of how to design, implement, and evaluate sustainability interventions across diverse tourism contexts.

While this review offers comprehensive thematic and theoretical integration, several limitations must be acknowledged. First, the study is restricted to English-language publications, potentially omitting valuable research from non-English speaking regions. Second, the reliance on four databases, while broad, may not fully capture the entirety of relevant gray literature, despite the inclusion of Google Scholar. Third, the synthesis does not employ formal meta-analytic or critical appraisal tools, although quality screening was conducted via methodological robustness and theoretical consistency. These limitations suggest that future reviews could incorporate multilingual searches, use databases such as Scopus or Web of Science, and adopt AMSTAR or CASP frameworks for formal evaluation. Such refinements would further enhance transparency and replicability.

5. Conclusion

This systematic review underscores the growing academic interest in sustainable and pro-environmental tourist behavior over the past decade. The analysis reveals a strong emphasis on psychological, contextual, and technological determinants of such behavior, particularly in the Asian and European contexts. Structural Equation Modeling (SEM) remains the dominant methodological tool, although there is a notable rise in the adoption of mixed methods and experimental designs to explore behavioral dynamics. Key themes identified include the intention–behavior gap, the influence of destination image and place attachment, and the potential of emerging technologies such as virtual reality and metaverse platforms to foster environmental awareness and identity. Despite these advancements, significant gaps remain. Research continues to be geographically skewed, underrepresents actual behavioral outcomes, and lacks longitudinal depth. Moreover, the translation of digital interventions into real-world pro-environmental actions remains underexplored.

Future research should address these limitations by incorporating diverse methodological approaches, engaging underrepresented regions, and examining long-term behavioral impacts to provide a more comprehensive understanding of how sustainable tourist behavior can be effectively cultivated and sustained. This review offers an integrative synthesis and informs future interdisciplinary research and destination strategies for fostering sustainable tourist behavior

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