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Natural soundscapes and satisfaction: unpacking the affective and cognitive drivers of tourist loyalty in nature-based tourist destinations

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ABSTRACT

This study examines the influence of natural soundscapes on tourist satisfaction and loyalty at nature-based tourist attractions (NBTAs). By examining the causal relationships between tourists' attitudes toward natural soundscapes, cognitive and affective image, loyalty and satisfaction, the study highlights the importance of auditory elements in developing stronger tourist connections to natural environments. Using a mixed methods approach, interviews with the stakeholders are directed to refine the measurement variables, followed by quantitative data collection from 359 foreign tourists visiting NBTAs across Fiji utilizing convenience sampling. To explore the influence of perceived tourist attitude and affective & cognitive image of soundscapes on tourist loyalty & satisfaction, the data was analyzed utilizing Structural Equation Modelling. Results revealed that perceived tourist attitudes towards natural soundscapes significantly influence cognitive and affective images, further influencing tourist loyalty. Satisfaction also mediated the association between loyalty and cognitive image. Furthermore, findings uncover that although emotional engagement with natural soundscapes is vital in developing loyalty, cognitive perceptions alone are insufficient to drive satisfaction. It also provides insightful information for the tourism industry, emphasizing the need to develop emotionally attractive, immersive experiences and promote positive perceptions about natural soundscapes to enhance visitor satisfaction and loyalty.

1. Introduction

Soundscapes are an essential part of the tourism environment since they substantially improve visitors' experiences and promote the development of tourist attractions (Jiang, Zhang, Zhang et al., 2018). According to Liu et al. (2018), they constitute an essential component of the surroundings and immensely affect how visitors feel, strengthen their impression of place, and are generally satisfied and pleased with the location. Since soundscapes encourage deeper connections with the surrounding environment and have therapeutic benefits, they are highly valued in nature-based tourism (Daugstad, 2008). Specialized sound experiences, like those provided by lush landscapes' complex

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environments, might attract tourists in large numbers. Despite their importance, the studies on natural soundscapes remain underexplored in tourism research and practice. Past literature has focused on visual stimuli, overlooking soundscapes' comprehensive sensory experiences (Jiang, Zhang, Zhang, et al., 2018). Porteous (1990), however, contended that visual stimuli alone are insufficient to capture the essence of an environment, perceiving that auditory element often have a more profound impact on attitude and ambiance.

Studying soundscapes in tourism, predominantly in an opulently diverse auditory environment like Fiji, is essential and marks a progressive shift in tourism research. This shift challenges the traditional "tyranny of the visual" by prioritizing auditory elements in the multisensory tourism experience. Highlighting the importance of this shift, Waitt and Duffy (2010) supported the greater importance of auditory aspects in tourism studies, urging a balanced approach that values both the sights and sounds of tourism destinations. Introduced by Schafer in the late 1960s, the soundscapes concept incorporates all sounds that reach a listener's ears within a particular environment (Schafer, 1977). This comprises desirable and undesirable noises (Schafer, 1977). Among these, natural soundscapes consist specifically of sounds from nature – such as rustling leaves, birds chime, waterfalls, gentle ocean breezes, the murmuring of streams, and wildlife calls (Jiang, Zhang, Zheng, et al., 2018). These sounds are readily connected with nature and are fundamental to how people experience and appreciate natural settings.

In Fiji, a nation known for its vibrant ecosystems and lush landscapes, nature-based tourism prospers with attractions ranging from the pristine beaches of the Coral Coast to the dense rainforests of Taveuni (Tourism Fiji, 2024). The unique soundscapes of these areas, whether the waterfalls of Bouma National Heritage Park or the coasts at Sigatoka Sand Dunes, play a crucial role in attracting and retaining visitors (Tourism Fiji, 2024). Past literature consistently reveals that guests prefer natural soundscapes, which positively influence their perceptions of the acoustic environment (Jiang, Zhang, Zhang, et al., 2018; Jiang, Zhang, Zheng, et al., 2018). Research by Taff et al. (2014) highlights that appreciating these natural soundscapes is a primary motivation for guests to national parks. The high value positioned on natural soundscapes by tourists highlights their significance as a key attraction within nature-based tourism destinations (Qiu et al., 2018; Zuo et al., 2020). Despite this, the role of natural soundscapes in enhancing tourist experiences has been relatively overlooked in tourism research, with only a few studies addressing this aspect (Chen et al., 2021; Frohlick & Macevicius, 2023). This oversight prompts a crucial yet unexplored research question: "How do natural soundscapes impact tourist loyalty and satisfaction at NBTAs in destinations like Fiji?" With Fiji's abundant natural attractions, soundscapes may significantly impact visitor satisfaction and loyalty, making this question particularly relevant.

Tourist loyalty is vital for destinations as it unfailingly predicts future behaviors (Aletta et al., 2016; Chen & Tsai, 2007). According to previous studies, motivation, trip quality, value perception, attachment to the place, purpose, individual engagement, contentment, and attitudes toward the place are some factors that impact visitor loyalty. Numerous natural environments, such as wetlands, coastal regions, forest places of recreation, national parks, rainforests, and the islands, have been the subject of research on these variables (Chen et al., 2021; Jiang & Yan, 2022). Natural soundscapes are vital to the NBTA

setting in Fiji. In addition to being sensory experiences, the calm rustle of leaves in Colo-i-Suva Forest Park, the soft sound of the waves at the Coral Coast, or the exotic calls of tropical birds in Bouma National Heritage Park are essential components that boost tourist satisfaction and loyalty (Tourism Fiji, 2024).

Although the value of natural soundscapes in enhancing visitor satisfaction is widely acknowledged, little research has been done on how they specifically affect tourist loyalty in these settings (Jiang et al., 2020). According to earlier research, soundscapes attract tourists and can increase repeat business (Bai et al., 2024; Lu et al., 2015). Kankhuni and Ngwira (2022) suggest that tourist satisfaction significantly affects loyalty and is an essential indicator of overall satisfaction. Loyalty increases significantly when visitors' expectations are fulfilled or surpassed, especially regarding their experiences with natural soundscapes (Jiang, 2022). Therefore, in locations like Fiji, where natural soundscapes are a prominent feature, ensuring these experiences meet tourist expectations could be critical in cultivating lasting loyalty (Kerstetter et al., 2010). Furthermore, according to Bai et al. (2024) and Kou and Xu (2024), tourist attitude is critical in explaining and forecasting behaviors, including satisfaction, perceptions, and loyalty. More specifically, we aim to understand if tourists' attitudes regarding Fiji's natural soundscapes affect how they perceive them and resultant behaviours, such as satisfaction and loyalty. In order to fill this vacuum in the existing literature, this study uses structural equation modeling to examine the causal links between the three constructs: attitude towards natural soundscapes, soundscape image, satisfaction, and loyalty.

This study intends to: (1) validate a tourist behavioural model within the setting of natural soundscapes experiences in Fiji; (2) expand the knowledge of how natural soundscape image predicts tourist behaviours in nature-based tourist attractions in Fiji; and (3) examine the potential mediating role of tourist satisfaction among these constructs. Unlike previous studies that have addressed soundscapes more generally, this research exclusively focuses on the natural soundscapes of the Fiji Islands in a tourist-linked setting and discovers their influence on tourists' experiences. Our findings will contribute to the studies on destination image and tourist loyalty by providing valuable insights into how the natural soundscapes of Fiji affect tourist behavior. Furthermore, this study will offer practical implications for tourism managers and stakeholders in Fiji, suggesting ways to create an attractive soundscape image and effectively utilize soundscape resources to enhance the overall tourist experience.

2. Literature review

2.1. Perceived tourists' attitude towards soundscapes at nature-based tourist attractions (NBTA)

Scholarly literature has demonstrated that a wide range of perspectives and behaviours can be explained and predicted by thoroughly understanding perceived tourist attitudes. Research has looked at a variety of perspectives, including host's attitudes towards visitors and tourism (Montazerolhodjah et al., 2019; Gursoy & Rutherford, 2004), how visitors feel about green tourism (Wu et al., 2021), and how tourists feel about experiencing tourism (Reule, 2024). Ajzen (1991) defined tourist attitude as a psychological state showing favorable or unfavorable assessments of specific actions or behaviours. This disposition is a

steady cognitive state that affects people's actions or reactions in particular situations. Many academics contend (Frohlick & Macevicius, 2023; Kou et al., 2024; Liu et al., 2018) that the primary element of perceived attitudes is a two- or three-component reaction to an item. In order to provide more detail, Lee (2009) combined perceived attitude into three different categories: affective (likes and dislikes), cognitive (perceptions, ideas, and knowledge), and behavioral (observed behaviours). Zhou et al. (2014) employ a somewhat distinct approach, classifying attitudes into two primary groups: affective and cognitive. This study examines attitudes focusing on NBTAs in the Fiji Islands using the "cognitive–affective" technique. The affective dimension captures emotions, including the level of attentiveness or interest in the natural soundscapes of Fiji that one experiences on every day and during holidays. Conversely, an individual's understanding of the unique natural characteristics unique to the Fijian environment determines the cognitive component. It considers their opinions, expertise, perspectives, or recently learned details about these soundscapes (Frost et al., 2014; Kerstetter et al., 2010).

This study aims to comprehensively understand how tourists' perceived attitudes towards natural soundscapes in Fiji influence their overall experience by focusing on these aspects. The pristine natural soundscapes of Fiji, from the serene sounds of coastal waves to the diverse calls of tropical birds in lush rainforests, offer a unique auditory background that can significantly boost the visitor experience (Rozon, 2025; Tourism Fiji, 2024). Understanding these attitudes helps better interpret how tourists perceive and value these natural elements, contributing to their satisfaction and loyalty (Kou & Xu, 2024). This comprehensive exploration will offer practical insights for tourism stakeholders in Fiji. By recognizing the significance of cognitive and affective aspects of tourist attitudes, stakeholders may produce strategies to highlight and preserve the natural soundscapes, enhancing the overall attractiveness of Fiji as a nature-based tourist destination. This approach will further enrich the tourists' experiences and support sustainable tourism practices by emphasizing the conservation of natural auditory environments.

2.2. Tourists' perceived image of natural soundscapes

Scholars have been intrigued by perceived image ever since Martineau's (1958) groundbreaking study suggested that perceived image frequently influences human behaviour more than objective truth. Using this as a starting point, the "image theory" proposes that an image is a person's cognitive or emotional response to an objective reality created in their mind (Myers, 1968). This perception results from both rational and emotive perceptions of events and situations. According to Yang et al. (2024), researchers commonly define an image as an emotional depiction that includes beliefs, feelings, and an overall perception of an objective world. This mental image changes as various characteristics are assessed. Within the domain of NBTAs in the islands of Fiji, the perception of a place is crucial in determining the behaviors and attitudes of visitors. The perception that visitors have of Fiji's natural surroundings can have a significant impact on their level of satisfaction, desires, and loyalty. Travellers worldwide are drawn to Fiji for its beautiful coastline, lush jungles, and vivid reefs (Gibson, 2015). Besides the islands' natural beauty, this image conveys a psychological and emotional response to the peaceful, pristine surroundings. Due to this, visitors' views of Fiji's natural surroundings play a crucial role in their entire travel experience.

The three-dimensional continuum approach and the three-component technique have been the two basic techniques for image evaluation that have been frequently utilized in earlier studies (Chan et al., 2024; Yang et al., 2024). Three continuums were utilized to conceptualize the image in the first method, which was originally suggested by Echtner and Ritchie (1991): "holistic–attribute," "general–unique," and "functional–psychological." This technique provides a comprehensive and complex view of the image formation. Conversely, the three-component technique, which is utilized more frequently in image investigations, posits that an image comprises three aspects: cognitive, emotive, and conative (Gartner, 1993). These philosophical frameworks have affected the creation of various measuring instruments and several studies on image perception. Instruments for measurement that concentrate upon the "cognitive–affective" aspects of image perceptions have lately shown merit as beneficial and applicable tools for evaluating images related to tourists (Prayag & Ryan, 2012). For instance, Davies et al. (2013) posits how soundscape perception is often divided into cognitive and affective elements. The affective element deals with subjective reactions, such as perceptions of peace or vigor, whereas the cognitive element deals with how a person responds to the information presented by a soundscape. The 'cognitive–affective' model will be used in this study to assess how foreign tourists perceive the Fiji Islands' natural soundscapes. Within this background, cognitive images relate to the evaluations made by tourists of the soundscape's features, for example, its cultural importance, environment, and operational purpose. On the contrary, affective images display the feelings that the soundscape produces, for example, happiness, satisfaction, or enthusiasm (Dávid et al., 2024; Grgurić et al., 2024). More precisely, visitors' perceptions and understanding of the meanings, cultural elements, and overall environment that the natural soundscapes of Fiji communicate are included in the cognitive image of these soundscapes (Frohlick & Macevicius, 2023). According to Ferguson et al. (2024), the affective element, on the other hand, represents the emotions and feelings evoked during the soundscape experience, such as satisfaction, happiness, and enthusiasm. This research attempts to provide extensive knowledge of how the natural soundscapes at the NBTA in Fiji affect visitor perceptions and behaviors.

Compared to the generally accepted notion of perceived image, a visitor's attitude reflects a more persistent and consistent cognitive foundation that influences how they understand and perceive natural soundscapes. Whether people perceive these soundscapes favorably or unfavorably depends on their cognitive frameworks (Marti Estape, 2024). Although the image is a subjective assessment or perception derived from actual interaction with natural soundscapes, attitude is an underlying tendency that influences this perception significantly. According to earlier studies, attitude significantly impacts how a situation is perceived, either positively or negatively. A more positive attitude towards a calligraphy landscape, for example, led to an increased feeling of authenticity in the overall experience, as Zhou et al. (2013) observed. Similar findings were reported by Lee and Walker (2024), who discovered that a consistent, positive attitude toward heritage tourism substantially enhanced tourists' perceptions of authenticity. Han et al. (2024) also noted that residents' views concerning the Pitons Management Area were more positive when they had an enhanced ecologically dedicated outlook. These investigations highlight the significant influence of attitude in determining how individuals view and assess cultural and natural environments. Thus, we propose:

H1: Tourists' perceived cognitive image of a natural soundscape in Fiji is positively influenced by their perceived attitude.

H2: Tourists' perceived affective image of a natural soundscape in Fiji is positively influenced by their perceived attitude.

2.3. Natural soundscapes and influence on tourist satisfaction and loyalty

Tourist satisfaction is an assessment that measures the difference between visitor expectations and their actual consumption findings (Han et al., 2024). In travel and recreation, satisfaction refers to a favourable assessment or sentiment acquired from a touristic leisure encounter (Kong & Han, 2024). It is a powerful indicator for determining the value of a vacation experience. Oliver's (1980) 'expectations-inconsistent' framework is an essential cognitive assessment instrument for measuring satisfaction which is widely employed in various sectors, including travel and leisure studies. However, various studies (Kou et al., 2024) claim that, besides cognitive assessment, affective evaluation plays a substantial role in producing satisfaction. As a result, numerous tourism researchers have developed tourist satisfaction assessments that consider both affective and cognitive factors.

Customer loyalty is a vital marketing idea representing a customer's assurance to a merchandise, brand, or service (Lee & Walker, 2024). It includes attitude loyalty, which reflects pleasant sentiments but does not result in repeated purchases; behaviour loyalty, which indicates recurrent purchases; and combination loyalty, which combines the two (Zuo et al., 2020). In tourism, this corresponds to tourist loyalty, in which the experience of travelling is the product, and loyalty is demonstrated by intentions to return or promote an attraction. Several studies (Kou et al., 2024) have confirmed effective assessment instruments for 'attitude-behavior' loyalty. In Fiji, the island's distinct soundscapes – from serene coastlines to busy markets – are fundamental to the tourism experience, with a considerable impact on tourist loyalty (Sinha & Bushell, 2002). Understanding how these soundscapes influence travellers' decisions to return or recommend Fiji might augment tourist satisfaction and promote sustainable tourism efforts.

Tourist satisfaction significantly influences loyalty (Yang et al., 2024). When visitors are pleased about their stay, they are more likely to suggest it to others and return in the future. Tourists with favourable memories are more inclined to become loyal to the place (Gupta & Sharma, 2024). This connection is significant when looking at Fiji's distinct soundscapes, essential in determining tourists' overall satisfaction. Fiji's biological and cultural soundscapes, which include tranquil ocean waves, indigenous Fijian music, and frantic marketplace sounds, significantly improve visitors' sensory perceptions. These auditory aspects add to the direct satisfaction of the surroundings and leave long-lasting impressions that may impact travellers' desires to return and suggest Fiji to others (Malani, 2002). Given these factors, we suggest the following hypothesis:

H3: Tourist loyalty is positively influenced by perceived tourist satisfaction.

Numerous studies have examined how a destination's image affects visitors' satisfaction and loyalty (Kankhuni & Ngwira, 2022; Zhou et al., 2014). Present research consistently shows a positive association between destination image, satisfaction, and loyalty (Han et al., 2024). The destination image significantly predicts visitor satisfaction and loyalty. A positive perception of a destination significantly affects tourist loyalty and satisfaction (Jiang & Yan,

2022). In Fiji, the natural soundscape is indispensable to the travel image. Thus, this study looks into whether tourist satisfaction and loyalty are significantly influenced by the perception of Fiji's natural soundscapes. Fiji's landscape provides distinct sound/auditory experiences, particularly the sounds of its beaches, forests, and biodiversity, which contribute to the general perception of the place (Malani, 2002). This study investigates how different soundscapes influence travellers' overall satisfaction during their visit and their probability of revisiting or promoting Fiji as a place to visit. Thus, we propose the following:

> H4: Tourist satisfaction is positively influenced by the perceived cognitive image in the natural soundscapes in Fiji
>
> H5: Tourist satisfaction is positively influenced by the perceived affective image in the natural soundscapes in Fiji
>
> H6: Loyalty is positively influenced by the perceived cognitive image in the natural soundscapes in Fiji
>
> H7: Loyalty is positively influenced by the perceived affective image in the natural soundscapes in Fiji

Tourist Attitude is a critical aspect in understanding and predicting behaviours. Tourism research has demonstrated the link between satisfaction, tourist attitudes, and loyalty (Kou et al., 2024). As per the findings on nature-based tourism, visitor attitudes directly impact satisfaction and indirectly affect loyalty. For example, in the backdrop of Fiji's soundscapes, favourable attitudes towards the unique auditory encounters provided by the natural setting may increase overall tourist satisfaction, endorsing a feeling of loyalty. This is consistent with results from the behavioural framework for leisure involvement, which displays that positive attitudes enhance visitor satisfaction and future behavioural intentions (Kou et al., 2024). However, not all tourist experiences exhibit this direct relationship. In calligraphy landscapes, for example, tourist attitudes had no direct effect on loyalty, consistent with earlier research (Wu et al., 2024). This disparity emphasizes that some sensory encounters, such as Fiji's natural soundscapes, can significantly boost tourist loyalty, while others may not. Nonetheless, numerous investigations have confirmed that tourist attitudes significantly impact loyalty, emphasizing developing positive perceptions to ensure continuous engagement and future visits (Wondirad et al., 2024). Thus, we propose:

> H8: Loyalty is positively influenced by perceived attitude towards the natural soundscape in Fiji
>
> H9: Tourist satisfaction is positively influenced by perceived attitude towards the natural soundscape in Fiji

2.4. How does tourist satisfaction mediate the various relationships in the natural soundscapes of Fiji?

An important analytical approach in the field of social sciences is mediation, especially in the context of Fiji's natural soundscapes. Determining whether the mediator variable has a whole or partial impact on the association amongst the independent and dependent variables is the aim of a mediation analysis (Xin-Chen et al., 2024). For this reason, an exhaustive understanding of the causative factors and the link between independent

and dependent variables depends on the reliability of the mediating effect study. Prior studies on tourism have confirmed that visitor satisfaction is a vital mediator factor (Lee & Walker, 2024). Given the variety of tourist behaviours, the relationship between attitude and loyalty produces contradicting results, with some finding significant impacts while others do not. This shows the necessity for an additional mediating variable. In Fiji, the unique natural soundscapes, which range from ocean waves to tropical bird melodies, can significantly impact tourist attitudes. Lee (2009) discovered that attitudes toward wetlands tourism enhance satisfaction, further impacting loyalty. Similarly, previous investigations have found that tourist attitudes affect loyalty when mediated by satisfaction (Qiu et al., 2018). Tourists' attitudes towards natural soundscapes may, therefore, impact their loyalty through increased satisfaction.

The image of a destination is widely recognized as an indicator of travellers' experiences, and a favorable perception can substantially increase tourist satisfaction and loyalty (Wondirad et al., 2024). In Fiji, natural soundscapes have a significant impact on shaping these experiences. A more diverse, attractive natural soundscape can significantly improve recreational satisfaction, consequently fostering the growth of tourist loyalty. When tourists are satisfied with the natural soundscapes of a destination such as Fiji, their loyalty increases (Qiu et al., 2018). The relationship between visitor loyalty and destination image is significantly mediated by visitor satisfaction. Lee (2009) revealed that a pleasant soundscape image significantly boosts visitor satisfaction and loyalty. Adding to this, Prayag (2009) highlighted that the relationship between destination image and subsequent travel behavior is significantly mediated by satisfaction among travelers. Chi and Qu (2008) also pointed out that the impact of the image of the destination on satisfaction indirectly affects loyalty to a destination. These results highlight the significance of tourist satisfaction in determining how destination image and loyalty are associated. Given the widely recognized influence of attitude and image on loyalty through satisfaction, very little research has been conducted to assess how tourist satisfaction directly mediates the natural soundscape experience. This gap emphasizes the necessity for more research into how the different soundscapes of places such as Fiji influence overall tourist satisfaction and loyalty. Thus, we propose:

> H10: The relationship between the cognitive image and tourist loyalty is mediated by satisfaction in the natural soundscapes of Fiji
>
> H11: The relationship between the affective image and tourist loyalty is mediated by satisfaction in the natural soundscapes of Fiji
>
> H12: The relationship between the perceived attitude and tourist loyalty is mediated by satisfaction in the natural soundscapes of Fiji

This study's model framework representing the relationships between the variables and the hypothesis proposed is presented in Figure 1.

3. Methods

3.1. Instrument development

This research employed a dual-phase mixed-method framework, combining qualitative and quantitative techniques, as proposed by Teddlie and Tashakkori (2006) and Creswell

and Clark (2011). This combined approach, as Creswell and Clark (2011) emphasize, enhances research rigor by leveraging the strengths of each method to mitigate the limitations of the other. Hewlett and Brown (2018) emphasize further that this research approach strengthens the appropriateness and dependability of study findings. The qualitative stage (interviews) directly assisted the development of our quantitative instrument, following an exploratory sequential design. In the preliminary qualitative stage, seventeen interviews were performed with stakeholders, including local NBTA experts, Tourism Fiji officials, and local villagers (including chiefs in some NBTA locations), to refine and finalize the measurement variables to be used for surveying tourists. The selection of seventeen interviewees was guided by data saturation, a widely accepted criterion in qualitative research for determining an adequate sample size (Andriotis, 2024; Saunders et al., 2018). During this process, we continuously analyzed interview transcripts to identify emerging insights by the stakeholders. By the fifteen interviews, no significantly new insights emerged, indicating that data saturation was reached. However, two additional interviews were conducted to confirm that no novel insights were introduced, ensuring inclusive reporting of stakeholder perceptions. Moreover, seventeen interview participants were selected to include a diverse range of stakeholders to capture an all-inclusive understanding of the research topic. These interviews aimed to classify and refine items related to the cognitive and affective image of natural soundscapes and attitudes toward natural soundscapes in Fiji, an area that has received comparatively minimal academic attention. This iterative process reinforced the validity of the survey instrument before the expert panel review and pilot testing phases.

The study instrument was developed following the comprehensive procedures for measurement development as suggested by Churchill (1979) and subsequently applied by Jiang et al. in a similar study on soundscapes in China. Initially, measurement items were generated based on an extensive literature review. Each measurement item was derived from prior investigations performed in similar contexts. Following the interviews with stakeholders at various NBTA sites in Fiji, some redundant measurement items were removed, and trivial amendments were made to the language of a few
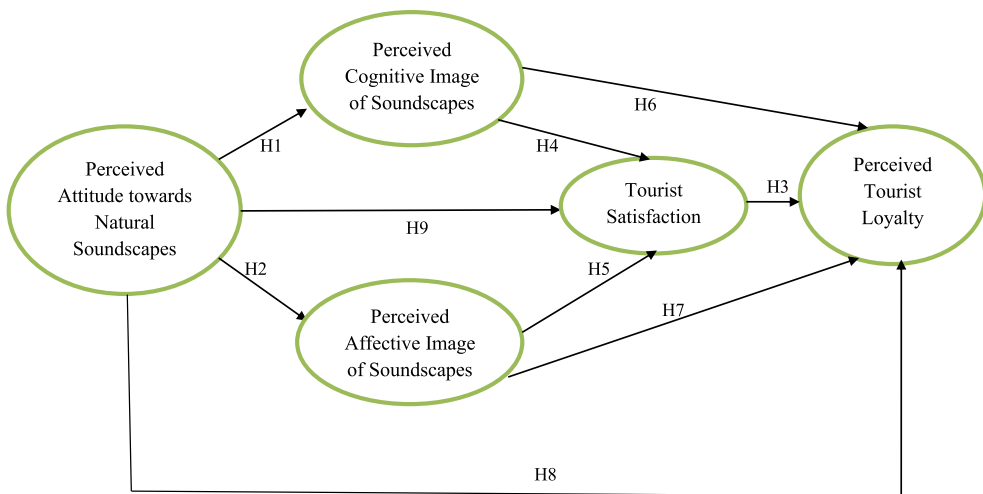
Figure 1. Study's model framework. Source: Author/s.

items. The refined list of items was then provided to an expert panel, including the sta-keholders and several prominent university professors in Fiji. The expert panel consisted of seven members, including four stakeholders (Two NBTA expert, one representative from Tourism Fiji, and one local village chief) and three university professors specializing in tourism, environmental studies, and soundscapes research. These experts were chosen based on their subject expertise, experience, and practical knowledge of the NBTA sector in Fiji. The presence of academic and industry professionals guaranteed that the measurement items were theoretically grounded while being contextually pertinent to real-world tourism practices. The panel evaluated the measurement items' applicability, relevance, and representativeness and their readability and clarity for further data collec-tion. Based on the panel's feedback, a list of 34 measurement items was established. The principal author obtained ethics approval for this university-funded research project.

Pilot testing was done to assess the dependability and rationality of the instrument. Following this, necessary rectifications were made, and eight items were removed due to their low reliability ($\alpha < 0.7$). These items were removed based on two factors: 1. Redundancy observed by the expert panel in instrument wordings, and 2. weak item-total correlation and low factor loadings. The final research instrument comprised 26 measurement items, including 10 items related to soundscape image, five assessing attitudes towards soundscapes, six measuring tourist satisfaction, and five evaluating tourist loyalty. Based on these measurement items, a final questionnaire was developed for tourists visiting the NBTA in Fiji. The survey was structured into two segments. The first segment clearly defined a natural soundscape to warrant participants' infor-mation on the subject under investigation. It also gathered sociodemographic infor-mation, such as Place of residence, education attainment, age, marital status, gender, Profession, annual household income, and purpose of visit to Fiji. The second section focused on the measurement scales: attitudes, image, loyalty and tourist satisfaction. This section included five latent variables and 26 measurement items rated on a 7-point Likert scale from Strongly Disagree (1) to Strongly Agree (7).

3.2. Data collection

Participants were selected based on suitability, convenience, and readiness to contribute, consistent with convenience sampling principles (Sedgwick, 2013). Questionnaires were randomly disseminated to tourists during their visits to these selected NBTA sites. The selection of convenience sampling was driven by its practicality and efficiency, particu-larly given the constraints of the research environment. This method is widely used in tourism studies where logistical challenges may make random sampling impractical (Etikan, 2016). Confidentiality of the respondents was stringently maintained throughout the study. The location intercept method was employed to maximize response rates, as it is known for its effectiveness in this regard (Malhotra, 2008). Data were collected at renowned nature-based tourism attractions (NBTA) across various key locations in the Fiji Islands, and these were selected based on their prominence, as highlighted on the Tourism Fiji website (Tourism Fiji, 2024). Though Fiji's rich biodiversity makes it a perfect site for researching natural soundscapes, its cultural and social elements also critically influence the appreciation of soundscapes. In Fijian culture, natural sounds are intertwined with cultural uniqueness, storytelling, and devoutness (Gibson, 2015).

Table 1. List of NBTA sites in Fiji.

Data Collection NBTA Site in Fiji	Location
Sigatoka Sand Dunes National Park, Nahehe Caves – Sigatoka Valley, Organic Sea salt making tour – Lomawai Village	Sigatoka
Kula Eco Park, Sigatoka River safari	Sigatoka
Thatched huts, Navala Village	Ba
Colo-I-Suva Forest Park & Nausori Highlands	Suva & Naitasiri
Garden of the Sleeping Giant	Nadi
Sabeto Hot Springs and Mud Pool	Nadi
Tavoro Waterfalls, Bouma Falls & Bouma National Park	Taveuni
Lavena Coastal Walk	Taveuni
Beqa Lagoon, Shark feeding sites	Pacific Harbour
Yasawa Island, Mamanuca Islands, Monuriki Islands	Port Denarau, Nadi
Vuadomo Waterfalls, Hotsprings, Wainibau Falls	Savusavu
Koroyanitu National Heritage Park and Mt Batilamu	Lautoka
Various sites across Coral Coast (Tourist lookout, etc.)	Coral Coast
Savulelele (Nabalesere) & Nakoroloaloa cave, Wailotua village, Dolphin sighting sites	Suncoast, Near Raki Raki

Source: Author/s.

Furthermore, Vanua (the deep connection between people, land, and landscape) raises a distinctive appreciation for natural soundscapes (Nabobo-Baba, 2008; Rozon, 2025). This background enhances the significance of Fiji as a perfect case, as the perceptions of natural soundscapes are affected not only by the environment but also by local culture and lived experiences. The complete list of these NBTA sites is provided in Table 1.

Respondents were asked to rate their agreement level with various measurement items through a 7-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (7). To ensure the authenticity of responses, investigators provided necessary instructions and clarifications. Eligibility criteria for participants included being a non-Fijian tourist, over 18 years of age, and having visited an NBTA site during their trip to Fiji. Data collection was conducted from December, 2023 to August 2024 from foreign tourists. 485 questionnaires were circulated, of which 394 valid responses were collected with a response rate of 81.24%, which were further assessed for any inconsistencies. Following Kim et al.'s (2022) methodologies, we applied multiple imputations to address missing data and mitigate potential biases in the sampling process.

Following the screening of Z-scores and the identification of outliers, nineteen questionnaires were excluded from the dataset. After excluding sixteen questionnaires having errors, 359 final responses were retained for data analysis. For the sample size determination, we followed Hair et al.'s (2021) 10-times rule, which needs at least 10 times the largest number of indicators per construct – in our study, six – suggesting a minimum of 60. Additionally, we applied Cohen's (1988) power analysis for medium effect size ($f^2 = 0.15$), $\alpha = 0.05$, and power = 0.80 indicating a minimum of 160 participants. We collected a larger sample to enhance robustness and account for potential missing data, aligning with Kline's (2017) recommendation of 200–300 cases for SEM studies. The skewness values of the remaining data ranged between −0.729 and −0.488, staying well within the acceptable threshold of 1, while kurtosis values were recorded between −0.612 and 1.304, conforming to the threshold of 3. The adequacy of the sample was confirmed through the confidence interval technique outlined by Burns et al. (2008), aiming for 95% accuracy with a 95% confidence level. To evaluate the reliability of the data, Cronbach's alpha was assessed, yielding a coefficient of 0.82, which exceeds the recommended

Table 2. Socio-demographics profiles of tourists (N = 359) visiting NBTA's.

Parameters	Frequency	Percentage	Parameters	Frequency	Percentage
Place of residence			**Profession**		
Oceania	129	35.93	Student	50	13.93
Asia	54	15.04	Self Employed	84	23.40
Europe	79	22.01	Salaried	147	40.95
North America	64	17.83	Home Maker	24	6.68
South America	18	5.01	Any other	54	15.04
Africa	15	4.18			
Gender			**Marital Status**		
Male	192	53.48	Unmarried	138	38.44
Female	163	45.40	Married	195	54.32
Non-binary	04	00.01	Separated	26	7.24
			Any other	00	00.00
Age			**Purpose of Visit to Fiji**		
Below 18 years	19	5.29	Leisure/Holiday	215	59.89
18–24	54	15.04	Visiting Friends/relatives	75	20.89
25–34	108	30.08	Business trip	34	9.47
35–44	93	25.91	Education	12	3.34
45–59	63	17.55	Any other	23	6.41
60 and above	22	6.13			
Education Attainment			**Annual Income (in US$)**		
High School	45	12.90			
Graduate	108	34.76	Below $25,000	37	10.31
Postgraduate	124	27.95	Between $25001 to $ 45000	76	21.17
Doctorate	36	09.31	Between $ 45001 to $ 65000	108	30.08
Professional Education	46	15.05	Between $ 65001 to $95000	82	22.84
			Between $ 95001 to $ 125000	37	10.31
			Above $ 125001	19	5.29

Source: Author/s.

threshold of 0.7, as per Nunnally (1978). The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.76, surpassing the minimum criterion of 0.60. Additionally, the dataset successfully passed the Bartlett test of sphericity, affirming the data's suitability and reliability for further analysis. The respondent's socio-demographics are provided in detail in Table 2.

4. Results and discussion

Partial least squares (PLS-SEM) were used to estimate the measurement items and structural equation modeling concurrently. The rationale for using it was due to its appropriateness for handling smaller sample sizes and non-normal data distributions (Hair et al., 2014). Unlike covariance-based SEM (CB-SEM), PLS-SEM focuses on maximizing explained variance (R^2) and is mainly useful for exploratory research where theory development is ongoing similar to this research. Smart PLS version 3.3.3 was applied for this study. Following Hair et al. (2014) standards, parameter estimations were computed and provided to improve the dependent variables' explained variance (R^2). Path coefficients (*t*-values) were analysed through the 3-S technique, which consists of size, significance, and sign, to validate the provided hypotheses within the measurement model. Smart PLS generated additional samples from the original dataset using a resampling technique, which made it possible to estimate the final parameters and compute mean estimates. A detailed overview of all the variables and items used in this study, along with their standard loadings, mean values, and standard deviations (SD), is provided in Table 3. The table also shows the validity and reliability metrics for the several scales that were

employed in the research. To confirm that every measurement item satisfies the pre-defined threshold limits, significant indicators like composite reliability (CR > 0.70), average variance extracted (AVE > 0.5), and standard loadings (>0.70) are also provided.

The convergent and discriminant validity, coherence, and overall model fit of the measurement model were rigorously evaluated using Confirmatory Factor Analysis (CFA) as presented in Table 4. The results demonstrated a robust model fit, with critical indices exceeding the required thresholds, indicating a generally good fit between the model's proposed and observed values ($X^2 = 915.603$, df = 430, $p < 0.001$, $X^2/$df = 2.129, CFI = 0.902, RMSEA = 0.093, IFI = 0.897). The reliability assessment revealed that the composite reliability ranged from 0.714 to 0.891, well above the acceptable benchmark of 0.70, thus confirming the robustness of the model.

Additionally, the Heterotrait-Monotrait (HTMT) ratio has been underlined by Rasoo-limanesh et al. (2017) as a more trustworthy and robust technique for evaluating discri-minant validity. The HTMT ratio provides a more precise evaluation by examining the correlations between variables across several constructs, in contrast to previous tech-niques, which mainly concentrated on the average correlations within constructs. As per Table 5, all variables utilized in this study had an HTMT ratio below the minimal threshold of 0.85, indicating the presence of discriminant validity.

4.1. Results of SEM and hypothesis testing

The PLS method was used in this research to evaluate the proposed hypotheses. The t-values of the path coefficients and the R^2 values, representing the explained variance of the dependent variables, were utilized to assess the structural model. Table 6 presents the R^2 values, demonstrating the variance explained. Nine of the twelve primary and sup-porting hypotheses were validated and supported by the results of the hypothesis testing. Goodness of fit Metrics such as $\chi^2 = 1216.019$, degrees of freedom (df) = 455, $\chi^2/$df = 2.673, Tucker-Lewis Index (TLI) = 0.91, Comparative Fit Index (CFI) = 0.903, Normed Fit Index (NFI) = 0.778, Goodness of Fit Index (GFI) = 0.93, and Root Mean Square Error of Approximation (RMSEA) = 0.083 showed that the structural model had a satis-factory fit. These indices surpassed the required thresholds, indicating statistical signifi-cance and validating the model's robustness and significance (Hair et al., 2014).

Within Fiji's nature-based tourism attractions, the hypothesis testing results revealed significantly new insights into the associations between perceived attitudes, cognitive and affective images of natural soundscapes, tourist satisfaction, and tourist loyalty. Results indicated a significant positive relationship between the perceived attitude and the per-ceived cognitive and affective image of natural soundscapes, showed by support of H1 (β = 0.610, $p < 0.01$) and H2 (β = 0.533, $p < 0.01$). These findings are consistent with Jiang et al. research. It suggests that guests who have a positive attitude toward the natural soundscapes in Fiji's nature-based tourist attractions are more inclined to develop posi-tive cognitive and affective perceptions to the attractions. This emphasizes how impor-tant it is to develop optimistic attitudes to improve the affective and cognitive image of natural soundscapes, which can augment visitors' overall experiences. Additionally, a sig-nificant correlation between perceived tourist loyalty and tourist satisfaction was noted (H3), as specified by β = 0.504, $p < 0.01$, and a t-value of 7.098. This outcome is confirmed by the verdicts of Chan et al. (2024) and Lam and Hsu (2006). Thus, it

Table 3. Results of standardized loadings, Cronbach's Alpha, Mean and SD (N = 359).

Constructs/ Measurement Items	Loadings	Mean	SD	Cronbach's Alpha (α)
Perceived cognitive image of soundscapes (CR: 0.835, AVE: 0.626)				0.833
The natural soundscapes in Fiji enhance the overall beauty of the environment.	0.823	4.33	0.63	
The harmony of natural sounds with the landscape improved my overall experience.	0.847	4.37	0.61	
I felt a strong connection to nature through the soundscapes in Fiji.	0.811	4.22	0.71	
The natural soundscapes contributed to a peaceful and serene atmosphere during my visit.	0.832	4.48	0.57	
The soundscapes added depth and dimension to my experience in Fiji	0.791	3.97	0.64	
Perceived affective image of soundscapes (CR: 0.826, AVE: 0.617)				0.801
Listening to the natural soundscapes in Fiji made me feel calm and relaxed.	0.827	4.43	0.62	
The sounds of nature in Fiji brought me feelings of happiness and joy.	0.842	4.38	0.66	
I felt more connected to the environment when I was surrounded by Fiji's natural sounds.	0.801	4.31	0.61	
The natural soundscapes in Fiji made me feel rejuvenated and refreshed.	0.780	3.68	0.53	
I found the natural soundscapes in Fiji to be soothing and comforting	0.802	4.41	0.59	
Tourist loyalty towards soundscapes (CR: 0.815, AVE: 0.635)				0.887
I would recommend Fiji to others specifically for its natural soundscapes	0.827	4.53	0.57	
I am likely to revisit Fiji because of its unique and beautiful soundscapes.	0.842	4.37	0.61	
I actively seek out travel destinations with rich natural soundscapes	0.813	4.34	0.63	
My experience with Fiji's soundscapes has made me loyal to similar destinations.	0.799	3.98	0.69	
I will share positive experiences about Fiji's soundscapes with my friends and family.	0.813	4.01	0.58	
I would prioritize visiting destinations that are known for their natural soundscapes.	0.794	3.56	0.60	
Tourist Satisfaction (CR: 0.869, AVE: 0.621)				0.803
I am highly satisfied with my experience of the natural soundscapes in Fiji	0.881	3.48	0.53	
The natural soundscapes in Fiji exceeded my expectations.	0.866	3.93	0.56	
The natural soundscapes significantly enhanced the value of my visit to Fiji.	0.852	4.19	0.58	
I consider the soundscapes a vital part of my overall satisfaction with my trip to Fiji	0.784	4.31	0.55	
My overall satisfaction with my visit to Fiji was greatly enhanced by its natural soundscapes.	0.852	3.94	0.52	
Perceived attitude (CR: 0.915, AVE: 0.741)				0.892
My experience with Fiji's natural soundscapes was truly memorable	0.901	4.69	0.47	
I found the natural soundscapes in Fiji to be fascinating.	0.894	4.63	0.50	
I enjoyed how the natural soundscapes were integrated into the environment.	0.856	4.61	0.54	
Overall, the natural soundscapes in Fiji made my trip more enjoyable and memorable.	0.868	3.97	0.46	
I believe that natural soundscapes are an essential part of the travel experience in Fiji.	0.892	4.65	0.51	

Source: Author/s.

implies that tourists who are satisfied and happy with their experience in Fiji are likelier to be loyal, highlighting satisfaction's critical role in promoting sustained interest in Fiji's natural soundscapes at various NBTA's. Therefore, it is crucial to ensure visitors feel satisfied to preserve and increase visitor loyalty.

Results did not confirm H4, showing a t-value of 3.009 and $\beta = 0.068$, $p < 0.01$. It suggests that cognitive perceptions, like how tourists describe and understand the natural soundscape, do not impact tourists' overall satisfaction to some degree. It is an extraordinary result that contradicts the results of Bai et al. (2024), as they discovered

Table 4. Results of Composite Reliability, Squared Correlations, and CFI.

Constructs	PECI	PEAI	PLOY	TSAT	PATT
PECI	**0.884**[a]	0.703[c]	0.617	0.077	0.394
PEAI	0.839[b]	**0.786**	0.279	0.628	0.094
PLOY	0.887	0.529	**0.793**	0.308	0.509
TSAT	0.728	0.891	0.555	**0.714**	0.556
PATT	0.944	0.745	0.845	0.746	**0.891**

a. Goodness of fit: (X^2 = 915.603, df = 430, $p < 0.001$, X^2/df = 2.129, CFI = 0.902, RMSEA = 0.093, IFI = 0.897)
b. PECI= Perceived Cognitive Image of Soundscapes; PEAI= Perceived Affective Image of Soundscapes; PLOY= Perceived Loyalty towards Soundscapes; TSAT=Tourist Satisfaction; PATT= Perceived Attitude
c. Notes: [a] Composite reliabilities were denoted in bold along the diagonal; [b] Correlation; [c] Squared correlation
Source: Author/s.

Table 5. Heterotrait-Monotrait ratios of Constructs.

Constructs	PECI	PEAI	PLOY	TSAT	PATT
PECI	0.701				
PEAI	0.727	0.547			
PLOY	0.609	0.689	0.483		
TSAT	0.522	0.498	0.510	0.577	
PATT	0.728	0.687	0.639	0.745	0.739

Note. PECI= Perceived Cognitive Image of Soundscapes; PEAI= Perceived Affective Image of Soundscapes; PLOY= Perceived Loyalty towards Soundscapes; TSAT=Tourist Satisfaction; PATT= Perceived Attitude.
Source: Author/s.

Table 6. Hypotheses testing results and Structural Equation Modeling (SEM) findings.

Relationship between the proposed hypotheses	t-values	Standardized Estimates	Supported/Not Supported
H1: Perceived Attitude → Perceived Cognitive image of Natural Soundscapes	4.014	0.610*	**Supported**
H2: Perceived Attitude → Perceived Affective image of Natural Soundscapes	3.309	0.533*	**Supported**
H3: Tourist Satisfaction → Perceived tourist loyalty	7.098	0.504*	**Supported**
H4: Perceived Cognitive image → Tourist Satisfaction	3.009	0.068*	**Not Supported**
H5: Perceived Affective image → Tourist Satisfaction	2.103	0.038	**Not Supported**
H6: Perceived Cognitive image → Perceived tourist loyalty	1.921	0.521*	**Supported**
H7: Perceived Affective image → Perceived tourist loyalty	5.607	0.547*	**Supported**
H8: Perceived Attitude → Perceived tourist loyalty	2.209	0.077*	**Not Supported**
H9: Perceived Attitude → Tourist Satisfaction	4.634	0.221**	**Supported**
H10: Perceived Cognitive image × Perceived tourist loyalty → [Mediation] Tourist Satisfaction	2.002	0.438**	**Supported**
H11: Perceived Affective image × Perceived tourist loyalty → [Mediation] Tourist Satisfaction	3.097	0.041**	**Not supported**
H12: Perceived Attitude × Perceived tourist loyalty → [Mediation] Tourist Satisfaction	2.169	0.012**	**Not Supported**

Goodness of fit: (χ^2 = 1216.019, df = 455, χ^2/df = 2.673, TLI = 0.91, CFI = 0.903, NFI = 0.778, GFI = 0.93, and RMSEA = 0.083), *$P < 0.001$
Total variance explained by constructs:
  R^2 (Perceived Attitude) = 0.701
  R^2 (Perceived Cognitive image) = 0.648
  R^2 (Perceived Affective image) = 0.581
  R^2 (Tourist Satisfaction) = 0. 441
  R^2 (Perceived Tourist Loyalty) = 0.365
Note: *$p < 0.01$; **$p < 0.05$; ***$p < 0.10$.
Source: Author/s.

that tourist satisfaction impacts positively the cognitive image perceived in natural soundscapes. This surprising result emphasizes the complexity of tourist satisfaction in nature-based settings by indicating that satisfaction could be affected by a wider

variety of elements than cognitive assessments. Similarly, a t-value of 2.103 and β = 0.038, $p < 0.01$ indicate that H5 is not supported. This result was also quite surprising and was revealed to be inconsistent with the earlier studies (Kou et al., 2024; Zhou et al., 2013) that established that tourist satisfaction in natural soundscapes was positively influenced by their perceived affective image. However, the result of our study implies that emotional or affective reactions to natural soundscapes in Fiji are not enough to satisfy visitors on their own. While these results suggest that other factors, including quality of service, environmental factors, or personal expectations, must be considered to enhance satisfaction among tourists visiting Fiji's natural attractions, emotional engagement is vital to the visitor experience.

With β = 0.521, $p < 0.01$, and t-value of 1.921, our results revealed that H6 was supported. This means that tourists are more loyal to these places if they have positive cognitive experiences of natural soundscapes. The high β value attests that one of the major elements for tourists' return intention is the appreciation of the cognitive features of natural soundscapes. This emphasizes how crucial cognitive involvement is in determining whether or not visitors would return to natural attractions. This result was also quite surprising and contrary to the findings of Bai et al. (2024), who revealed that perceived tourist loyalty is not influenced positively by their perceived cognitive image of natural soundscapes. With a t-value of 5.607 and a β = 0.547, $p < 0.01$, our findings also corroborated H7, which is not consistent with the findings of Zhou et al. (2013). This finding highlights the importance of affective relationships in creating tourist loyalty. It indicates that emotional reactions to natural soundscapes in Fiji are a stronger predictor of loyalty than the cognitive image, as indicated by the larger standardized estimate for the affective image. This underlines how important it is for tourism administrators to concentrate on developing engaging and emotionally stimulating experiences that significantly affect tourists. The psychological bonds created by these encounters are essential to build loyalty and attract tourists back.

Our findings also revealed a β = 0.077, $p < 0.01$, and a t-value of 2.209, which means that H8 is not supported. This finding was also confirmed by the findings of Jiang et al. This implies that only the natural soundscapes perception is not a good predictor of tourists' loyalty. The non-significant relation means that while positive attitudes are required, loyalty does not automatically result from it. Various factors likely contribute to loyalty; therefore, tourism managers should consider adding extras that improve the overall tourist experience and promote return visits. This research emphasizes the complexities of tourist loyalty and the demand for a holistic approach to developing it.

On the other hand, H9, which had a β = 0.221, $p < 0.05$, and a t-value of 4.634, was supported by our results. This result is astonishing and contrary to previous studies (Zhou et al., 2013), which revealed that perceived attitude does not positively influence tourist satisfaction with natural soundscapes. However, our findings suggest that positive attitudes towards natural soundscapes highly influence visitor satisfaction. According to the positive association between perceived attitude and satisfaction, travellers with positive attitudes are more likely to be satisfied with their encounters at nature-based attractions. This emphasizes how crucial it is to use efficient marketing techniques, on-site experiences, and communication to generate and sustain positive attitudes among tourists. Improving tourist satisfaction is essential in establishing positive experiences and promoting return visits.

4.2. Testing for mediation effect

Many investigators have previously utilised the causal stepwise regression method established by Baron and Kenny (1986) to investigate the mediation effect. But recent research has put into question this method's reliability and methodological validity. Although it was designed to overcome some weaknesses of the causal stepwise regression approach, the Sobel test (Sobel, 1982) assumes that the data are normally distributed, which is not always true in real-world situations (MacKinnon et al., 2004). On the other hand, the Bootstrap approach – which Preacher and Hayes (2004) advocated – is increasingly recognised as an improved replacement. This method provides greater statistical strength and eliminates the limitations of the Sobel test and causal stepwise regression. Therefore, this study utilized the bootstrap method to analyse how tourist satisfaction mediates various associations in the setting of soundscapes in Fiji.

Following Sobel's (1982) recommendations, two requirements are required to be met to validate a mediating effect: (1) the mediator (tourist satisfaction) must exert a substantial direct impact on the outcome variable (tourist loyalty); and (2) the predictor variables (attitude, affective, and cognitive image) should have a substantial direct impact on the mediator (tourist satisfaction). As Figure 2 illustrates, attitudes toward the natural soundscape did not significantly impact tourist satisfaction. As a result, no relationship existed between attitudes towards natural soundscapes and tourist loyalty that was mediated by visitor satisfaction. This study performed a further review with a sample size of 2000 to more thoroughly explore the mediating influence of tourist satisfaction amongst the natural soundscape image in Fiji and tourist loyalty. We obtained a 95% confidence interval using the non-parametric percentile bootstrap method. Results revealed no mediating influence of tourist satisfaction among affective image and tourist loyalty, as indicated by the confidence interval for the indirect effect among affective image and loyalty ranging from −0.09 to 0.82, including 0. The 95% confidence
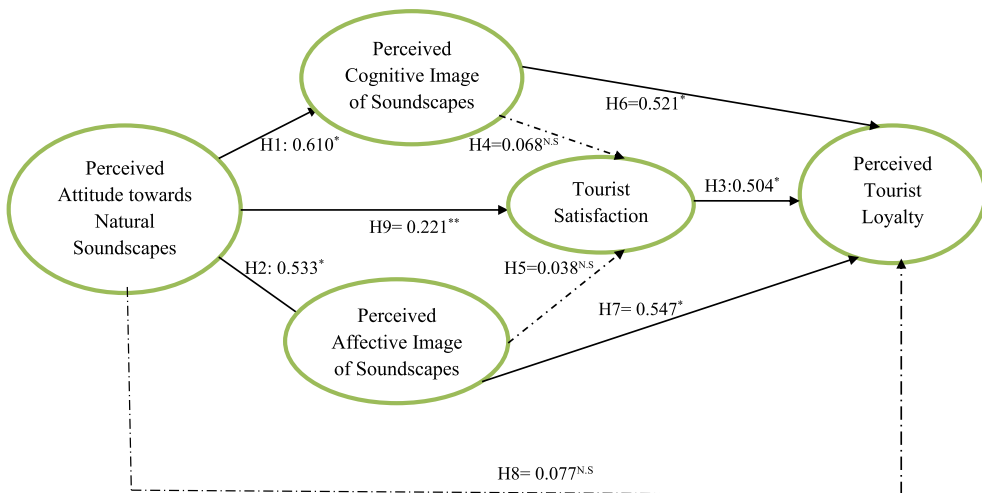
Figure 2. Results of SEM. Source: Author/s.

Notes: N.S. = Not supported, $*p < 0.01$; $**p < 0.05$; $***p < 0.10$, Bold lines indicates the significant path while dotted line show insignificant path.

range for the indirect relationship between cognitive image and tourist loyalty in the setting of Fiji's natural soundscapes was between 0.11 and 0.59. The fact that this interval excludes 0 indicates a mediating role of tourist satisfaction between cognitive image and loyalty. On the other hand, the direct relationship between tourist loyalty and cognitive image has a 95% confidence interval that varies from −0.13 to 0.61, including 0. This means that the direct relationship is not statistically significant. As a result, the cognitive perception of natural soundscapes and visitor loyalty is entirely mediated by tourist satisfaction. Consequently, it was found that while H10 was supported, H11 and H12 were rejected. These findings align with the Stimulus-Organism-Response (S-O-R) model and Expectancy-Disconfirmation Theory, emphasizing the role of experiential evaluation in shaping behavioral outcomes. Our findings suggest that while cognitive and affective perceptions of soundscapes are important, they do not directly translate into loyalty unless they enhance overall satisfaction.

5. Implications

The results from this study advance our complementary knowledge of the interplay of perceived attitudes, affective and cognitive images, and tourist behaviour when visiting Fiji's natural soundscapes. Thus, apart from introducing theoretical implications for existing theories, the identified insights also deliver practical implications for future research and real-world applications of nature-based tourism management. The findings from this study have several theoretical implications that challenge and build upon established theories of tourist behaviour. Until now, the cognitive and affective components have always been regarded as the core variables contributing to tourist satisfaction and loyalty (Kong & Han, 2024). Nevertheless, the findings indicate that cognitive evaluations may not be strongly correlated with satisfaction, highlighting the intricacies of tourist satisfaction in nature-based contexts. This implies that satisfaction may be driven by a broader array of elements than predicted by current theoretical models (more comprehensive than personal expectations, physical environment, and social relationships), which existing theory fails to capture sufficiently. Thus, it is paramount to use a more complex methodology encompassing these different components and reconsider the prevalence of cognitive and affective factors in these models.

Moreover, the significant positive relationship between perceived attitudes and affective and cognitive image highlights how attitudes influence visitors' experiences in natural settings. Based on this research, theoretical models should prioritize attitudes more, especially when natural environments play a substantial role in the tourism experience. Furthermore, the different impacts of the affective and cognitive image on tourist loyalty contradict present theories that consider both dimensions equally important; connections to natural soundscapes appear more significant in determining repeat visits. These findings highlight the necessity of developing new models or adapting preexisting theories to fit specific settings, such as Fiji, to more fully explain how tourists behave in these uniquely cultural and environmental environments.

Findings from this research provide valuable insights for better tourist satisfaction and loyalty at Fiji's nature-based attractions. The results highlight positive attitudes toward natural soundscapes since they change individual's cognitive and affective attitudes about the environment. If this is to be achieved, tourism stakeholders need to focus on

creating engaging and informative experiences that enhance tourists' connections within the natural soundscapes. This could involve meditation sessions, sound-based tours, and interpretive programs to engage tourists in the sensory-diversity of the natural environment. Additionally, targeted advertisements that use immersive information and sound recordings to evoke strong emotions in consumers should highlight Fiji's distinctive auditory experiences to attract potential tourists. Stakeholders can enhance tourist satisfaction and the whole visitor experience by promoting a positive attitude towards these natural environments. Destination managers may include new-age technologies into their tourism offerings for developing a better visitor experience and engagement in Fiji's natural soundscapes. Visitors can gain real-time educational insights through the use of the smartphone apps, augmented reality (AR), and immersive soundscape maps, to understand the environmental and cultural significance of natural soundscapes. Artificial intelligence-powered noise monitoring systems can help keep the authenticity of these settings intact, and audio-guided excursions with interactive storytelling can increase cognitive engagement. Utilizing technology to create engaging and personalized experiences can also increase tourist satisfaction and foster long-term loyalty from stakeholders.

Furthermore, this study emphasizes the importance of including emotional engagement and satisfaction as significant variables influencing loyalty. While there is an application for cognitive engagement with natural soundscapes, sustained visitor satisfaction levels are necessary to generate long-term loyalty (Kou et al., 2024). To ensure a memorable visit, stakeholders should take a comprehensive strategy, considering what is expected of the natural soundscape and service quality, infrastructure, and customized experiences. Enhancing guest experiences by combining cognitive and emotional factors is essential for encouraging return visits, as further evidenced by the mediating influence of satisfaction between cognitive image and loyalty. Our findings also suggest that tourism administrators might benefit from audience segmentation based on visitor preferences, motives, and expectations, as not all visitors are affected similarly by cognitive and affective perceptions of natural soundscapes. By recognizing them, managers can customize experiences that match the preferences of emotionally or cognitively driven segments. Customized experiences can improve visitor satisfaction and loyalty by responding more effectively to the distinctive demands of various traveller groups.

This study provides numerous significant implications for the government regarding encouraging nature-based tourism. First and foremost, priority should be given to infrastructure projects that improve the experience of the natural soundscape. To ensure minimal disturbance to the surrounding environment – especially the soundscape – government agencies should consider creating or improving the infrastructure in NBTAs. To keep these natural areas authentic, noise pollution from neighboring construction sites or vehicles should be limited. To improve visitor satisfaction and develop loyalty, policies promoting eco-friendly transportation, quiet zones, and noise reduction techniques would enable visitors to experience the distinctive soundscapes of Fiji's natural attractions fully. Finally, nationwide campaigns highlighting natural soundscapes' significance would be a compelling government initiative. Tourism promotional efforts might incorporate awareness programs that emphasize the distinctive auditory environments of Fiji's natural attractions. This would further improve Fiji's tourism industry by enhancing the

appeal of the country's landscapes and aligning with global developments towards sustainable and ethical tourism activities.

6. Limitations

Though this investigation provides valuable understandings into the impact of natural soundscapes on tourist loyalty and satisfaction in NBTA's in Fiji, several limitations must be recognized to provide context for the findings and guide further studies. First, this study restricts the findings' applicability to other locations by concentrating only on NBTAs in Fiji. Fiji's distinctive natural and cultural features could not be representative of other nature-based tourism locations, which could limit the applicability of the findings in other geographic contexts. To improve the external rationality of the results, future research could broaden the scope to incorporate a variety of geographies and ecosystems. Second, as the data collection for this study was directed within an explicit period (Dec, 2023–Aug, 2024), it might not have adequately captured how tourists' impressions and experiences changed over various seasons or years. Weather, seasonal travel variations, or shifts in the surrounding environment may influence tourists' encounters with natural soundscapes. Future longitudinal research may yield a more thorough understanding of these dynamics. Third, convenience sampling was utilized in this research due to logistical and practical challenges; therefore, the challenge of generalizability and potential bias might exist (although all potential efforts have been taken to remove any biases). A stratified sampling approach could have improved representativeness, and therefore, future research should consider employing stratified sampling techniques to enhance the external validity of findings in similar tourism contexts. Lastly, without taking into account other sensory inputs like visual, tactile, or olfactory sensations that significantly influence how tourists experience nature-based attractions, this research concentrates mainly on auditory experiences. Thus, future studies may employ a multisensory framework to investigate how diverse perceptions connect and ultimately enhance the satisfaction and loyalty of travellers.

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