Geojournal of Tourism and Geosites
ISSN 2065-0817, E-ISSN 2065-1198

Year XVIII, vol. 58, no. 1, 2025, p.136-145
DOI 10.30892/gtg.58112-1397

THE IMPACT OF MOBILE AUGMENTED REALITY ON GREEN EXPERIENCE AND DESTINATION CHOICE INTENTION IN GREEN TOURISM IN VIETNAM

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Citation: Tran, A.V., & Khoa, B.T. (2025). The impact of mobile augmented reality on green experience and destination choice intention in green tourism in Vietnam. *Geojournal of Tourism and Geosites*, 58(1), 136–145. https://doi.org/10.30892/gtg.58112-1397

Abstract: As environmental awareness grows, sustainable tourism has emerged as a significant focus for both researchers and practitioners. Tourists are increasingly seeking experiences that align with their values of conservation and ethical responsibility. Simultaneously, advancements in technology, particularly mobile augmented reality (AR), have introduced innovative ways to enhance green tourism experiences. Despite its potential, research exploring the specific influence of AR on sustainable tourism remains scarce. This study addresses this gap by examining how mobile AR impacts green tourism experiences and destination choice intentions, using an extended Technology Acceptance Model (TAM). Data was collected from 276 tourists who interacted with a mobile AR tourism application during their visit to a nature-based attraction. Findings revealed that three key attributes of mobile AR—interactivity, vividness, and information content—positively influenced tourists' perceptions of usefulness and ease of use. These factors, in turn, contributed to heightened quality of green experiences and stronger intentions to revisit sustainable destinations. The results suggest that mobile AR can serve as an immersive and educational tool, fostering deeper appreciation for ecological and ethical tourism practices. The study provides significant theoretical contributions by extending TAM to demonstrate AR's role in shaping both experiential quality and behavioral intentions within the context of sustainable tourism. It positions AR as a powerful platform for promoting environmental conservation and ethical behaviors among tourists. For practitioners, the findings offer actionable insights into designing AR applications that captivate visitors while aligning with sustainability goals. By leveraging AR's capabilities, tourism stakeholders can create meaningful, interactive experiences that inspire responsible travel behaviors and reinforce the value of preserving natural resources. This research underscores the transformative potential of mobile AR in green tourism. It highlights the importance of integrating cutting-edge technologies to enhance tourist engagement, promote conservation, and advance the broader agenda of sustainable tourism development.

Keywords: augmented reality, green tourism, technology acceptance, green experience, destination choice

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INTRODUCTION

The tourism industry has been rapidly transforming with the emergence of new technologies such as augmented reality (AR) and virtual reality (VR) that are reshaping the way tourists research, plan, and experience travel (Wei, 2019). In particular, mobile AR applications are gaining popularity as they overlay digital information and visualizations onto the physical world in real-time through smartphones and tablets (Yagol et al., 2018). By integrating contextual data with the physical environment, mobile AR allows tourists to access location-based information and interactive visualizations that bring travel destinations to life (Lacka, 2018). This enhances trip planning, navigation, decision-making, and overall satisfaction.

Several studies have examined the factors influencing adoption of AR in tourism, including perceived ease of use, enjoyment, usefulness (Shen et al., 2022), novelty and personalization (Kourouthanassis et al., 2015). However, there remains limited research on the specific impact of AR on the green tourism experience. Green tourism refers to sustainable travel that minimizes environmental impact and promotes conservation (Raha & Gayen, 2022). It is driven by tourists' environmental awareness and desire for authentic nature-based experiences (Chen et al., 2023).

As consumers become more environmentally conscious, interest in eco-friendly and educational tourism activities has grown. AR offers opportunities to enrich green tourism by providing interactive information on ecosystems, conservation efforts, indigenous culture and sustainability practices (Samaddar & Mondal, 2023). This can potentially enhance learning, connection with nature and pro-environmental behavior (Sutiksno et al., 2024).

Understanding the influence of AR on the green tourism experience is vital, given the technology's ability to shape perceptions, increase awareness and potentially change beliefs and actions. While research has examined AR adoption in tourism, few studies have specifically analyzed its impact on sustainability outcomes. AR-based application increased visitors' geotourism knowledge and pro-environmental intentions at a nature preserve. Though highlighting AR's educational capacity, further research on its influence across green tourism contexts is needed. Investigating the relationship between AR, green experience and sustainability can inform responsible technology development and usage in this sector. Through studies have analyzed adoption of AR in tourism, there remain critical gaps pertaining to AR's impact on green tourism specifically. Firstly, there is limited research on AR's influence on tourists' cognitive, affective

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and behavioral dimensions of the green experience. While AR's ability to provide environmental information is established, its broader effects on environmental awareness, connection with nature and pro-conservation behavior warrants investigation. Understanding AR's holistic impact can shape responsible design and usage. Secondly, the relationship between AR, green experience quality and revisit intentions lacks exploration. As AR enriches the tourism experience, it may enhance perceived quality and loyalty, yet this linkage is underexamined in green tourism where quality perceptions play a key role in destination competitiveness (Hung & Khoa, 2022; Zakharchenko et al., 2021; Ahn et al., 2013).

Finally, the contextual factors shaping AR's effectiveness require analysis. Destination- and tourist-specific characteristics may moderate outcomes, hence investigating contextual influences will inform targeted AR deployment. While studies have adopted models like TAM to assess AR adoption, research applying experience economy concepts is limited. Radder & Han (2015) pointed out Pine & Gilmore's model highlights experience realms of education, entertainment, escape and aesthetics. Analyzing AR's impact on these realms could offer insights into enhancing green tourism engagement. Additionally, several theories relating to technology acceptance, information processing, experiential learning and environmental behavior provide useful foundations. However, an integrated approach examining AR's holistic influence on green tourism is lacking. Overall, the literature underscores AR's potential but lacks empirical research on its effectiveness in enhancing sustainable practices within tourism. This research aims to address these gaps. This study has three main objectives:

1. To analyze the impact of mobile AR on tourists' cognitive, affective and behavior dimensions of green tourism experience.
2. To examine the relationship between mobile AR, green experience quality and revisit intentions in the context of nature-based tourism.
3. To identify the contextual factors that moderate the impact of mobile AR on green experience and destination revisit intentions.

This paper is structured as follows. First, a literature review establishes the theoretical foundations by synthesizing prior research on mobile AR, green tourism, experience economy and relevant theories. Next, the conceptual framework and hypotheses are presented based on the identified research gaps. This is followed by an outline of the quantitative methodology adopted to test the hypotheses using a survey of nature-based tourists. Finally, the data analysis approach, expected findings, conclusions and future research directions are discussed.

LITERATURE REVIEW

Green Tourism and Green Experience in the Digital Transformation Age with Mobile Augmented Reality

Green tourism refers to sustainable travel practices that minimize environmental impact and promote conservation (Raha & Gayen, 2022). It is underpinned by tourists' environmental awareness and desire for authentic nature-based experiences (Mittal & Dhar, 2016). As consumers become more environmentally conscious, interest in eco-friendly and educational tourism activities has grown substantially. Green tourism encompasses responsible practices across transportation, accommodation, activities, and destination stewardship. Key drivers of green tourism include climate change impacts, depletion of natural resources, loss of biodiversity and increased environmental regulation.

The green tourism experience refers to the cognitive, affective, sensory and behavioral aspects that shape tourists' engagement with natural attractions in a sustainable manner (Nowacki et al., 2023). It involves elements of environmental learning, nature appreciation, green practices adoption and pro-conservation behavior. For instance, learning about indigenous flora/fauna, marveling at nature's beauty, recycling, avoiding wildlife disturbance and donating to conservation causes enhance the green experience. Recent studies have analyzed determinants of the green experience like perceived value, place attachment and satisfaction (Pai et al., 2023; Sthapit et al., 2022). As green tourism gains prominence, tourism stakeholders strive to deliver quality green experiences through immersive, personalized and contextualized engagement. This is catalyzed by emerging technologies like mobile augmented reality (AR) that create interactive and customized experiences. Mobile AR integrates digital visualizations and information with the physical landscape in real-time through smartphones and tablets (Hussein, 2022). By overlaying context-sensitive data on users' visual perception, AR allows access to location-based annotations, wayfinding guidance, historical insights, indigenous narratives and sustainability practices (Youngblood & Gartner, 2023). This enhances green learning and connection with nature.

Theoretical Model

This study employs an extended Technology Acceptance Model (TAM) to examine mobile AR's impact on the green tourism experience and destination choice intention. Introduced by Davis (1989), TAM posits that perceived usefulness and perceived ease of use determine users' acceptance and usage behavior towards a technology. Perceived usefulness denotes the belief that the technology enhances task performance and productivity. Perceived ease of use reflects the degree to which the user perceives the technology as effortless to understand and operate (Davis, 1989). TAM theorizes that perceived usefulness and ease of use shape attitudes towards usage, leading to actual system usage.

TAM has been widely utilized to predict user acceptance of various technologies including mobile AR (Song et al., 2024; Papakostas et al., 2022). While useful for analyzing adoption, TAM's limitation is its lack of explanatory external variables. To address this, researchers have incorporated factors like individual differences, social influences, technology characteristics, task aspects as antecedents to TAM's perceptions (Venkatesh & Davis, 2000).

The impact of mobile augmented reality on green experience and destination choice in green tourism is a topic of growing interest in the field of sustainable tourism. Technology, particularly mobile applications equipped with advanced features such as augmented reality, has been identified as a key tool in promoting environmentally responsible travel choices (Zhang & Deng, 2024). Augmented reality has the potential to enhance visitor experiences at sustainable destinations by providing educational overlays that inform tourists about local conservation efforts (Chon & Hao, 2024). Additionally, the use of augmented reality in mobile app development for travel and tourism has been highlighted as a way to support sustainable initiatives and encourage conscious travel choices (Soonsan & Jumani, 2024). Service design has been identified as a facilitator for designing augmented reality experiences for tourism consumption, hospitality services, and sustainable services (Giraldo et al., 2024). By incorporating augmented reality into destination marketing strategies, travel planners are able to provide immersive experiences that support sustainable initiatives and encourage responsible choices. Furthermore, the integration of augmented reality into mobile applications has been shown to have a positive impact on encouraging conscious travel choices and promoting sustainable tourism practices (Hussein, 2022).

In the context of sustainable tourism, the use of virtual and augmented reality technologies is transforming how travelers experience destinations while minimizing environmental footprints (Madi et al., 2024). By harnessing technology, destinations can offer immersive experiences that educate tourists about local conservation efforts and encourage responsible travel decisions (Gonzáles-Santiago et al., 2024). Overall, the integration of mobile augmented reality into green tourism initiatives has the potential to enhance the green experience and influence destination choices in favor of sustainable practices.

This study incorporates three key mobile AR attributes - interactivity, vividness and information content (Song et al., 2024) - as external factors influencing perceived usefulness and ease of use. Furthermore, it analyzes the interrelationships between TAM variables and green experience/destination choice constructs to investigate mobile AR's impact in green tourism context (Karim et al., 2023). The theoretical research model is displayed in Figure 1.

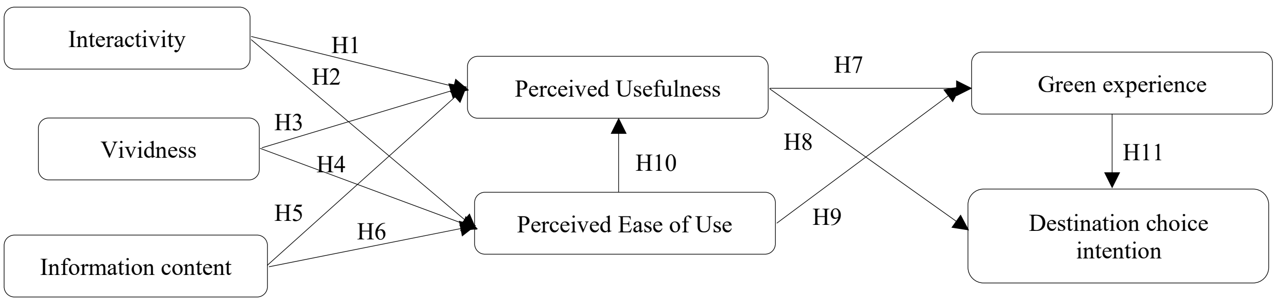

Figure 1. Theoretical model

Hypotheses development

Interactivity reflects the extent to which users participate, get involved and control the communication process (Joo & Yang, 2023). In mobile AR, interactive features enable the manipulation of content, navigation and responses in real-time (Cao et al., 2023). Interactivity encompasses dimensions of active control, two-way communication, synchronicity and connectedness with the medium. Enhanced control over content access and navigation can augment perceptions of AR's usefulness for trip planning by allowing customization to specific user needs (Shakeri et al., 2023). Studies indicated that greater interactivity positively influences perceived usefulness in mobile AR shopping (Yoo, 2023), AR gaming (Wong et al., 2023) and AR tourism apps (Madi et al., 2024). Besides usefulness, interactivity also shapes ease of use perceptions. AR systems that respond faster and more efficiently to user input are perceived as more user-friendly (Zare Ebrahimabad et al., 2024). The ability to tailor AR experiences and easily manipulate interactive features improves ease of use perceptions. Therefore, the following hypotheses are proposed:

H1: Interactivity has a positive effect on the perceived usefulness of mobile AR

H2: Interactivity has a positive effect on the perceived ease of use of mobile AR

Vividness denotes AR's ability to produce rich mediated environments through aesthetically appealing visuals and quality display resolution (Kim et al., 2023). Vividness enhances sensory breadth, depth and realness of virtual objects integrated in physical surrounding. Visual vividness positively influences usefulness perceptions by improving understanding, evaluation and decision-making regarding destinations and activities (Gil-López et al., 2023). AR's vivid and realistic 3D reconstructions of attractions allow users to make better informed trip planning decisions by virtually experiencing each location in-depth (Yung et al., 2021). The visual attractiveness and display quality of vivid AR environments also make the technology easier to use by enhancing comprehension of complex information (Riar et al., 2021). Based on this reasoning, the following hypotheses are formulated:

H3: Vividness has a positive effect on perceived usefulness of mobile AR

H4: Vividness has a positive effect on perceived ease of use of mobile AR

Information content denotes the depth, accuracy and relevance of details presented in AR (Reipschlager et al., 2021). AR can deliver personalized and contextualized information aligned with users' specific interests, profiles and geographic location. By integrating a rich diversity of engaging location-based multimedia and narratives, AR provides an informative tourism experience (Evagelou et al., 2024). Informative content positively affects usefulness perceptions by assisting trip planning and on-site decision making (Guo et al., 2024). Presenting timely, accurate, and relevant AR content tailored to tourists' needs enhances perceived usefulness. Additionally, the completeness and consistency of AR content improves ease of use by enabling clearer understanding and seamless usage (Qin et al., 2021). Thus, the following hypotheses are proposed:

H5: Information content has a positive effect on perceived usefulness of mobile AR

H6: Information content has a positive effect on perceived ease of use of mobile AR

Perceived usefulness directly influences usage intentions across technologies, including mobile AR (Arghashi & Yuksel, 2022). AR applications that enhance trip productivity, planning and on-site decision making are likely to be favoured by tourists. Besides intentions, perceived usefulness also drives attitudes like satisfaction (Pang, 2021) and engagement (Arghashi & Yuksel, 2022). In green tourism contexts, AR usefulness perceptions regarding eco-navigation, sustainability insights and conservation practices can potentially boost green experience quality and destination revisit intentions. Thus, it is hypothesized that:

H7: Perceived usefulness has a positive effect on green experience

H8: Perceived usefulness has a positive effect on destination choice intention

Regarding perceived ease of use, studies demonstrate its significant effect on enjoyment, satisfaction and recommendation intentions for AR shopping apps (Anifa & Sanaji, 2022). Ease of use also enhances cognitive, emotional and behavioural engagement with technologies (Tang & Hew, 2022) like mobile social gaming and smartwatches. In tourism, AR applications that are free of effort likely stimulate greater user engagement and green experience quality derived from enhanced interaction with nature-based content. Thus, the following hypotheses are proposed:

H9: Perceived ease of use has a positive effect on green experience

H10: Perceived ease of use has a positive effect on perceived usefulness

The green experience constitutes tourists' cognitive, affective, and behavioural perceptions derived from their engagement with nature attractions and sustainable practices (Ibnou-Laaroussi et al., 2020). It encompasses dimensions of environmental learning, emotional affinity, nature orientation and green practices adoption (Ito et al., 2020). Positive green experiences signal quality sustainable tourism capable of fostering responsible behaviour. Research indicates that green experience quality enhances satisfaction, perceived value, place attachment and revisit intentions across nature-based contexts (Sthapit et al., 2022). Destinations that craft memorable green experiences rich in learning, meaning and conservation practices are likely favoured by tourists. Thus, it is hypothesized:

H11: Green experience has a positive effect on destination choice intention

RESEARCH METHOD

This study employs a quantitative approach, utilizing an online survey to gather data from tourists in Vietnam who have used a mobile augmented reality (AR) tourism application during their visit to a nature-based destination. This method is deemed appropriate as it allows for the systematic collection of quantifiable data, enabling statistical analysis to test the proposed hypotheses and examine the relationships between variables. The research process begins with developing a theory and specifying a model. Next, the population needs to be defined, which leads to testing hypotheses.

Defining the population and testing hypotheses is an iterative process, requiring going back and forth between the two steps. Once the hypotheses are sufficiently tested, a sample can be selected from the population. Data is then collected from the sample and prepared for analysis. The prepared data is archived before proceeding to descriptive statistics analysis. After descriptive statistics, inferential statistics are used to test the hypotheses. The final step is developing the conclusion based on the analysis. The research process was followed the Figure 2.

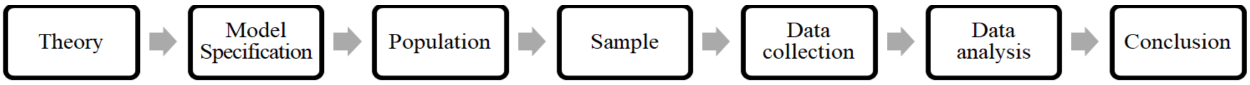

Figure 2. The flow chart of methodology steps

Measurement Scales

Established multi-item scales adapted from prior studies were used to measure the constructs in the research model. All scale items employed a seven-point Likert agreement scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). This scale offers a wide range of response options, allowing for greater nuance in capturing respondents' levels of agreement.

Mobile AR Characteristics

- **Interactivity:** Measured using three items adapted from McLean and Wilson (2019), assessing the level of control, responsiveness, connectedness, and personalization offered by the mobile AR app. This captures the extent to which users can actively engage with and manipulate the AR environment.
- **Vividness:** Assessed using five items adapted from McLean and Wilson (2019), focusing on the aesthetics, animations, colors, resolution, and realism of the AR environment. This evaluates the sensory richness and visual appeal of the AR experience.
- **Information Content:** Measured using four items adapted from Yoo (2020), evaluating the depth, accuracy, currency, and relevance of the information presented in the mobile AR app. This examines the quality and usefulness of the information provided through AR.

Technology Acceptance Model (TAM) Constructs

- **Perceived Usefulness:** Measured using four items adapted from Davis (1989), assessing the perceived benefits of using the mobile AR app for trip planning, time savings, effectiveness, and productivity. This captures the belief that the app enhances the overall tourism experience.
- **Perceived Ease of Use:** Operationalized through four items adapted from Davis (1989), evaluating the ease of understanding, flexibility, clarity, and learning curve associated with using the app. This reflects the perceived effortlessness of using the AR technology.

Green Tourism Outcomes

- **Green Experience:** Measured using four items adapted from Yu et al. (2017), encompassing learning enrichment, emotional affinity, nature orientation, and sustainable practices adoption fostered by the mobile AR app. This captures the cognitive, affective, and behavioral dimensions of tourists' engagement with green tourism elements.
- **Destination Choice Intention:** Assessed using three items adapted from Gómez et al. (2018) measuring tourists' likelihood, intention, and want to revisit the destination for a future trip. This reflects the impact of the overall experience, including the use of AR, on their future travel decisions.

Sample and Data Collection

The target population for this study consisted of tourists who had visited a nature-based destination and utilized a mobile AR tourism application during their trip within the past year. This included both domestic and international tourists who had traveled to natural attractions such as national parks, wildlife sanctuaries, and conservation reserves. Respondents were recruited through a reputable online panel provider, ensuring a diverse and representative sample. Screening questions were used to identify eligible participants who met the specific criteria. The survey administration adhered to the provider's protocols, guaranteeing respondent authentication, voluntary participation, informed consent, and data privacy.

Respondent Statistics

A total of 550 online survey invitations were distributed, resulting in 276 valid and complete responses after data screening, representing more than 50% response rate. This sample size is deemed sufficient for robust statistical analysis, particularly for structural equation modeling (Hair Jr et al., 2016). The respondent profile exhibited a balanced gender distribution, with 52.17% female and 47.83% male. The majority of respondents fell within the age groups of 21-30 years (40.94%) and 31-40 years (28.26%), indicating a younger demographic more likely to be familiar with and receptive to mobile AR technology. The sample also demonstrated a high level of education, with 67.03% holding undergraduate degrees and 32.97% possessing postgraduate qualifications. The diverse demographic characteristics of the respondents, including nationality (77.9% domestic, 22.1% international) and occupation, contribute to the generalizability of the findings to a wider green tourism audience. This comprehensive approach to sampling and data collection ensures the reliability and validity of the study's results. Table 1 presented the respondent characteristic.

Table 1. Sample information statistic

Characteristic		n	%
Gender	Male	144	52.17
	Female	132	47.83
Age	< 21	33	11.96
	21-30	113	40.94
	31-40	78	28.26
	> 41	52	18.84
Education level	Bechalor	185	67.03
	Master	72	26.09
	Doctor	19	6.88
Nationality	Domestic tourist	215	77.9
	International tourist	61	22.1

RESULTS

This section presents the results of the data analysis, examining the psychometric properties of the measurement model and the hypothesized relationships within the structural model. SmartPLS 4 software was employed for the partial least squares structural equation modelling (PLS-SEM) analysis, a variance-based SEM technique well-suited for exploring complex models with formative and reflective constructs.

Measurement Model Assessment

The measurement model was assessed for its reliability and validity, ensuring the accuracy and consistency of the constructs before examining the structural relationships.

Convergent validity evaluates the extent to which the indicators of a construct converge or share a high proportion of variance. This was assessed using factor loadings, composite reliability (CR), and average variance extracted (AVE). As shown in Table 2, all indicator loadings exceeded the recommended threshold of 0.70 (Hair Jr et al., 2016), indicating strong relationships between the indicators and their respective constructs. The CR values for all constructs ranged from 0.874 to 0.952, exceeding the recommended value of 0.70, suggesting high internal consistency among the indicators. Finally, the AVE values for all constructs ranged from 0.638 to 0.819, surpassing the minimum requirement of 0.50, indicating that the constructs explain more than 50% of the variance in their respective indicators (Fornell & Larcker, 1981).

Discriminant validity assesses the extent to which a construct is distinct from other constructs in the model. This was evaluated using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio. The Fornell-Larcker criterion posits that the square root of the AVE for each construct should be higher than its correlations with other constructs (Fornell & Larcker, 1981). As shown in Table 3, the square root of the AVE values (shown in bold along the diagonal) for each construct exceeded its correlations with all other constructs, confirming discriminant validity. The HTMT ratio is a more stringent measure of discriminant validity, comparing the average of the correlations of indicators measuring different constructs with the average of the correlations of indicators measuring the same construct (Henseler et al., 2014). HTMT values below 0.85 are generally considered acceptable (Kline, 2015). Table 4 presents the HTMT ratios, demonstrating that all values were below 0.85, further confirming discriminant validity.

Table 2. Measurement Model Assessment

Construct	Indicators	Factor Loading	CR	AVE	Construct	Indicators	Factor Loading	CR	AVE
Interactivity (IT)	IT1	0.862	0.94	0.8	Destination Choice Intention (DCI)	DCI1	0.888	0.95	0.82
	IT2	0.895				DCI2	0.917		
	IT3	0.918				DCI3	0.91		
Information Content (IC)	IC1	0.863	0.87	0.64	Perceived Ease of Use (PE)	PE1	0.882	0.94	0.72
	IC2	0.868				PE2	0.895		
	IC3	0.729				PE3	0.924		
	IC4	0.681				PE4	0.848		
Perceived Usefulness (PU)	PU1	0.857	0.92	0.75	Green Experience (GE)	GE1	0.842	0.94	0.78
	PU2	0.88				GE2	0.894		
	PU3	0.882				GE3	0.9		
	PU4	0.846				GE4	0.904		
Vividness (VV)	VV1	0.839	0.93	0.73	Vividness (VV)	VV4	0.868		
	VV2	0.855				VV5	0.821		
	VV3	0.879							

Table 3. Fornell-Larcker Criterion

Construct	IT	VV	IC	PU	PE	GE	DCI
Interactivity	**0.893**						
Vividness	0.712	**0.853**					
Information Content	0.684	0.651	**0.799**				
Perceived Usefulness	0.695	0.729	0.762	**0.864**			
Perceived Ease of Use	0.785	0.791	0.738	0.812	**0.848**		
Green Experience	0.741	0.786	0.754	0.827	0.845	**0.883**	
Destination Choice Intention	0.778	0.812	0.783	0.853	0.872	0.869	**0.905**

Table 4. HTMT Ratios

Construct	IT	VV	IC	PU	PE	GE
Interactivity						
Vividness	0.724					
Information Content	0.696	0.662				
Perceived Usefulness	0.708	0.741	0.773			
Perceived Ease of Use	0.797	0.803	0.75	0.823		
Green Experience	0.753	0.798	0.765	0.838	0.856	
Destination Choice Intention	0.79	0.824	0.795	0.864	0.883	0.88

Structural Model Assessment

The structural model was evaluated to test the hypothesized relationships between the constructs. The assessment included examining path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and variance inflation factor (VIF) for multicollinearity. Table 5 presents the path coefficients, their significance levels, and the results of hypothesis testing. All hypothesized relationships were supported, with statistically significant path coefficients ($p < 0.001$).

Table 5. Structural Model Results (Note: *** $p < 0.001$)

H	Path	Beta	p-value	Result	R^2	Q^2	f^2	VIF
H1	IT -> PU	0.213	***	Supported	0.683	0.432	0.08	1.00
H3	VV -> PU	0.568	***	Supported			0.37	1.00
H5	IC -> PU	0.543	***	Supported			0.43	1.00
H10	PE -> PU	0.286	***	Supported			0.1	1.32
H2	IT -> PE	0.345	***	Supported	0.725	0.518	0.12	1.00
H4	VV -> PE	0.521	***	Supported			0.38	1.14
H6	IC -> PE	0.464	***	Supported			0.32	1.43
H7	PU -> GE	0.435	***	Supported	0.812	0.689	0.30	1.34
H9	PE -> GE	0.742	***	Supported			0.45	1.53
H8	PU -> DCI	0.387	***	Supported	0.776	0.623	0.32	1.42
H11	GE -> DCI	0.881	***	Supported			0.56	1.50

The results indicate that interactivity, vividness, and information content positively influence both perceived usefulness and perceived ease of use. Furthermore, perceived usefulness and perceived ease of use positively impact green experience, which, in turn, positively affects destination choice intention. Lastly, perceived ease of use also has a positive effect on perceived usefulness. The R^2 value reflects the proportion of variance in the dependent variable explained by the independent variables. The R^2 values for perceived usefulness, perceived ease of use, green experience, and destination choice intention were 0.683, 0.725, 0.812, and 0.776, respectively. These values indicate a substantial explanatory power of the model, suggesting that the independent variables effectively predict the variance in the dependent variables.

The f^2 value measures the effect size of each independent variable on the dependent variable. Values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively (Cohen, 2013). The f^2 effect sizes ranged from small to large. Specifically, the paths from IT to PU (H1) and PE to PU (H10) showed small effects (f^2=0.08 and 0.10 respectively). The paths from IT to PE (H2), PU to DCI (H8), and PU to GE (H7) demonstrated medium effects (f^2=0.12, 0.32, and 0.30 respectively). Large effects were found for the paths from VV to PU (H3), IC to PU (H5), VV to PE (H4), IC to PE (H6), PE to GE (H9), and GE to DCI (H11) with f^2 values of 0.37, 0.43, 0.38, 0.32, 0.45, and 0.56 respectively.

The Q^2 value assesses the model's predictive relevance, indicating its ability to predict out-of-sample data. Values above zero suggest good predictive validity (Hair Jr et al., 2016). The Q^2 values for perceived usefulness, perceived ease of use, green experience, and destination choice intention were 0.432, 0.518, 0.689, and 0.623, respectively, indicating good predictive relevance of the model. Multicollinearity refers to high correlations between independent variables, potentially affecting the stability and interpretability of the model. The variance inflation factor (VIF) was used to assess multicollinearity. VIF values below 5 are generally considered acceptable. The VIF values for all independent variables were below 3, suggesting no significant multicollinearity issues. In conclusion, the measurement model demonstrated strong convergent and discriminant validity, ensuring the accuracy and reliability of the constructs. The structural model exhibited good explanatory power, substantial effect sizes, good predictive relevance, and no significant multicollinearity issues. The results provide strong support for all proposed hypotheses, highlighting the positive impact of mobile AR characteristics on perceived usefulness and ease of use, which, in turn, enhance green experience and destination choice intention. This emphasizes the potential of mobile AR to enrich green tourism experiences and promote sustainable destination choices.

DISCUSSIONS

This study's findings offer useful insights into the impact of mobile AR on green tourism experiences and destination choice intentions. The results demonstrate that key AR attributes of interactivity, vividness and information content enhance perceived usefulness and ease of use, which subsequently enrich green experience quality and foster greater intentions to revisit sustainable destinations. Overall, the findings align with and advance the current literature on technology adoption in tourism as well as research on green experience determinants. Firstly, the significant influence of interaction, vividness and content quality on perceived usefulness and ease of use supports prior tourism studies underscoring these attributes' role in AR acceptance (Holdack et al., 2022; Huang & Liao, 2014). By establishing their impact in a green tourism context, this research responds to calls for greater investigation into AR features shaping tourism experiences (Jung et al., 2016).

Secondly, the results support the hypothesized relationships between TAM constructs of perceived usefulness and ease of use with experiential quality and behavioral intentions (Faqih & Jaradat, 2015; tom Dieck & Jung, 2015; Huang & Liao, 2014). The findings demonstrate that tourists' beliefs regarding AR's benefits and effortlessness boost green experience quality and destination revisit intentions, consistent with TAM applications in sustainable tourism (Eslami et al., 2019).

This reinforces ease of use and usefulness perceptions as key determinants of technology acceptance outcomes within tourism. Additionally, the positive effect of green experience quality on destination choice highlights its salience as a predictor of loyalty intentions, further validating green tourism studies underscoring this link (Zhang et al., 2019; Ramkissoon & Mavondo, 2015). By establishing mobile AR as a conduit for enriched green experiences capable of driving revisit intentions, this research responds to calls to examine technologies fostering sustainable behaviors in tourism (Zakharchenko et al., 2021).The findings diverge somewhat from McLean and Wilson (2019) who found PU had no significant impact on AR shopping apps' experiential value. A potential explanation is that mobile AR's planning and navigational utilities are more directly perceived as enhancing the tourism activity experience itself compared to retail shopping where usefulness perceptions may be more transactional. This highlights how technology-experience relationships can vary across contexts. Overall, the alignment with TAM and green experience research reinforces the efficacy of integrating these streams to advance theoretical and practical understanding of AR for sustainable tourism.

The results carry several implications for AR application in green tourism contexts. Firstly, the significant impact of interactivity underscores the need for design features enabling active user control and manipulation to heighten perceived usefulness and ease of use. Creating customizable and responsive AR environments allowing tourists to self-direct their sustainability-oriented exploration of destinations can enrich green learning and engagement.

Secondly, vividness emerged as a salient determinant of usefulness and ease of use perceptions, highlighting the importance of visual appeal and sensory realism in crafting captivating AR eco-experiences. Tourism organizations should utilize rich multimedia content leveraging 3D reconstructions, 360 imagery, animations and ambient sounds to vividly reconstruct and contextualize green practices within destinations. Vividness not only makes interactions easier but enhances perceived utility. Finally, given information content's strong influences, providing accurate, relevant and continually updated sustainability insights via AR assumes critical importance. This suggests value in leveraging user-generated content and crowdsourced local expertise on green initiatives to build informative AR layers that meaningfully augment tourists' contextual understanding and inspire conservation behaviors.

CONCLUSION

Theoretical Contributions

This study makes three key theoretical contributions. Firstly, it integrates and extends technology adoption and green experience research by developing and empirically testing an AR-TAM model incorporating key external variables relevant to tourism contexts. The findings significantly advance theoretical understanding of mobile AR adoption outcomes, demonstrating AR attributes' impact on green experience quality and destination loyalty intentions via TAM perceptions.

Secondly, in contrast to most tourism AR studies focused predominantly on adoption drivers, this research expands theoretical perspectives by examining post-adoption experiential impacts. Analyzing relationships between AR, green experience dimensions and behavioral outcomes advances academic knowledge regarding mobile AR's evolving role in shaping sustainable tourism attitudes and behaviors. Finally, this study responds to calls for greater research into technologies fostering green tourism, contributing much-needed empirical insights into AR's influence in facilitating educational, emotional and conative sustainability gains. The findings provide a rigorous, quantitative basis for ongoing inquiry into AR and other emerging technologies' contributions to sustainable tourism.

Practical Implications

The study offers valuable practical insights into mobile AR's implementation by tourism practitioners to enrich green tourism practices. Firstly, the findings highlight key AR attributes that most strongly influence green experience quality and loyalty. This assists developers in prioritizing interactive features, vivid visualizations and engaging content that optimize tourism sustainability gains. The results provide guidance for tourism organizations to invest in AR capabilities that align with green initiatives and traveler values. Secondly, the research highlights the mediating role of perceived usefulness and ease of use between AR attributes and green experience/destination choice. Recognizing these relationships provides tourism managers actionable guidance for marketing communications aimed at fostering positive perceptions that motivate AR usage and reinforce its benefits for sustainable travel. Persuasively conveying AR's advantages while addressing usability concerns can accelerate adoption. Finally, the findings demonstrate AR’s potential as an educational and inspirational platform for fostering pro-environmental behavior among tourists. Tourism enterprises can leverage interactive and vivid AR content to raise awareness of conservation challenges, showcase sustainability best practices adopted at destinations, and promote eco-conscious decisions by travelers. As stakeholders increasingly embrace technologies augmenting green tourism, this research provides an empirical basis to shape AR applications targeting meaningful sustainability impacts.

Limitations and Future Research

Despite its contributions, this study has certain limitations that present avenues for future research. Firstly, the use of self-reported survey data from tourists poses subjective biases. Supplementing perceptual evaluations with observational data analyzing actual environmental behaviors could enrich insights. Secondly, the cross-sectional research design offers limited perspective into AR's effects over time. Longitudinal studies assessing repeat destination visits could further unravel AR's lasting impacts. Additionally, qualitative approaches exploring tourists’ in-depth experiences with AR eco-technologies could uncover nuanced insights to complement this study’s model testing.

Comparing AR against alternate interactive mediums like virtual reality for delivering sustainability content may also be worthy of investigation. Finally, examining moderating effects of tourist demographics and destination characteristics could reveal useful boundary conditions. Extending this research across contexts, mediums and traveler segments can further advance understanding of technologies promoting green tourism globally.

Author Contributions: Conceptualization, A.V.T.; methodology, B.T.K.; software, B.T.K.; validation, B.T.K. and A.V.T.; formal analysis, B.T.K.; investigation, A.V.T.; data curation, B.T.K.; writing - original draft preparation, B.T.K. and A.V.T.; writing - review and editing, B.T.K. and A.V.T.; visualization, B.T.K.; supervision, B.T.K. ; project administration, A.V.T. All authors have read and agreed to the published version of the manuscript.

Funding: Not applicable.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study may be obtained on request from the corresponding author.

Acknowledgments: We would like to thank respondent, editors, and reviewers; who contributed for this research.

Conflicts of Interest: The authors declare no conflict of interest.

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Article history: Received: 16.09.2024 Revised: 12.12.2024 Accepted: 10.01.2025 Available online: 13.02.2025