Promoting Responsible Tourism using Generative AI Nudges

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Abstract

Purpose: With rapid modernization and globalization, responsible tourism practices at cultural heritage sites are in decline, as many visitors disengage from activities like volunteering, donating, or mindful visits. This shift presents a significant challenge for governments, organizations, and societies working to promote meaningful interactions with cultural heritage. Encouraging responsible tourism—where visitors respect local cultures while minimizing negative impacts—is crucial. Generative Artificial Intelligence (GAI) offers an emerging avenue for innovative management practices, providing personalized and emotionally resonant digital nudges that can influence visitor engagement. However, limited empirical evidence exists regarding which types of nudges are most effective across cultural contexts. This study investigates the impact of AI-driven nudges delivered on emotional response and engagement, aiming to foster responsible tourism behaviour.

Design/ Methodology/ Approach: Using a mixed-methods approach, this study adopted a three-stage investigation. First, this study conducted a content analysis gathered from 262 articles via web scrapping which identified five key themes surrounding responsible tourism. Stage two consisted of 25 in-depth interviews, which provided deeper insights on the factors influencing emotional response towards cultural heritage tourism. In stage 3, this study conducted 300 experiments and surveys, focusing on responses to six cultural nudge images representing Indian and UK cultures. Each image was categorized into neutral, positive, and negative nudges, capturing participants' engagement.

Findings: The findings suggest that AI-driven nudges significantly enhance tourists' emotional responses ($\beta = 0.108$, $p < 0.05$) and engagement towards cultural heritage tourism ($\beta = 0.224$, $p < 0.001$), leading to greater appreciation and respect for local cultures and in turn leads to responsible tourism behaviours. Most importantly, engagement was found to be a powerful predictor of responsible tourism behavior, demonstrating a strong positive relationship ($\beta = 0.792$, $p < 0.001$). Negative nudges (afraid, bitter) were most effective in encouraging responsible behaviours. However, the effectiveness of nudges varied based on an individual's cultural identity, perceived cultural accuracy and AI hallucination potential highlighting the importance of tailored approaches for diverse audiences.

Research Limitations/ Implications: The study is limited by a small sample, focus on Indian and UK contexts to capture participants' perceptions and immediate responses to AI-driven nudges. It examines short-term behavioural intentions within a controlled experimental setting and applies continuous moderation to explore cultural effects. Building on these insights, future research can expand to broader cultural contexts, adopt longitudinal designs to assess behavioural change over time, incorporate objective behavioural data, and explore the role of AI transparency and immersive technologies such as VR and AR in enhancing responsible tourism engagement.

Originality: This study provides novel empirical evidence on the role of Generative AI–driven emotional nudges in shaping responsible tourism behaviour, integrating cultural identity, perceived cultural accuracy, and AI hallucination as key boundary conditions in a cross-cultural context.

Keywords: Generative AI, Nudges, Cultural Heritage, Responsible Tourism, Engagement

1. Introduction

Tourism represents one of the world's most dynamic service sectors, with its productivity shaped not only by technological innovation (Shamim et al., 2025), but also by the effectiveness of management practices adopted by destination authorities, cultural organizations, and heritage-site managers. As tourism experiences intensify through digital transformation, organizations responsible for the preservation and economic sustainability of cultural heritage sites are increasingly expected to deploy innovative management approaches that improve operational monitoring, behavioral compliance, and stakeholder engagement (Patyal et al., 2017; Bloom et al., 2012). This is especially relevant in contexts where increased tourist flows to heritage sites are accompanied by a decline in responsible tourism practices, as many tourists disengage from pro-social behaviors such as volunteering, donating and mindful conducts. This erosion of responsible conduct and engagement pose growing challenges for destination managers, heritage organizations and local communities seeking to preserve their cultural assets while sustaining social and economic value. Encouraging responsible tourism has therefore become a managerial and societal priority as it contributes to the long-term productivity of heritage sites by minimizing destruction, fostering community benefits, and reducing maintenance costs associated with irresponsible visitor behaviors (Mukherjee, 2024).

While responsible tourism is widely recognized as a pillar of sustainable heritage management, much of the existing literature adopts a static, consumer-centric perspective (e.g., Stanford, 2008; Su et al., 2018; Paskova et al., 2019; and Ding et al., 2025), providing limited insights into the dynamic mechanisms, such as digital choice architecture (Chivirova et al., 2026), through which heritage sites can actively influence and shape tourist behaviors in real-time. Traditional heritage communication campaigns typically rely on static message framing strategies that

emphasize moral duty, preservation norms, or collective responsibility. These approaches are generally applied uniformly across audiences and often depend on informational appeals or generalized pro-social messaging. While such campaigns may raise awareness, they frequently lack personalization and emotional calibration, which can lead to moral fatigue, psychological reactance, or disengagement, particularly when messages are perceived as repetitive or externally imposed (Berger et al., 2022; Mirbabaie et al., 2021). In contrast, Generative Artificial Intelligence (GAI) introduces new possibities as it supports behavioral interventions, personalized communication, and visitor engagement strategies (Dogru et al., 2025; Shamim et al., 2025). AI-driven emotional nudges introduce three fundamentally distinct capabilities. First, they enable dynamic personalization, aligning heritage protection messages with individual cultural identities, value systems, and emotional predispositions (Hollebeek et al., 2024; Mehta et al., 2022; Dogru et al., 2025). Second, they allow contextual timing, delivering emotionally resonant cues at moments of heightened cognitive or affective receptivity within digital environments (Weinmann et al., 2016). Third, through adaptive learning mechanisms, AI systems can iteratively refine message framing by identifying which emotional narratives foster authentic engagement rather than superficial compliance (Kaplan and Haenlein, 2019). This shifts heritage communication from static persuasion to responsive behavioral calibration. As such, AI-driven nudges do not merely replicate traditional message framing in digital form; they transform it into a culturally contingent and continuously optimized intervention mechanism. From an organizational perspective, GAI creates new pathways for value creation by optimizing what Bloom et al. (2012) identify as the pillars of firm performance: information processing and coordination efficiency. GAI extends these mechanisms by enabling dynamic personalization algorithms capable of automatically generating tailored persuasive content based on user behaviour, contextual data and interaction

history (Dwivedi et al., 2023). Through such adaptive systems, organisations can scale individualised communication strategies that would otherwise require substantial human labour. In heritage tourism contexts, AI-driven nudges can dynamically adjust emotional narratives, cultural references and responsible tourism messages to different visitor segments, increasing engagement while reducing monitoring and enforcement costs. Consequently, GAI-driven nudges create firm-level value not only through behavioural influence but also through scalable personalization and improved marketing productivity, allowing organisations to deploy more efficient and responsive visitor management strategies (Erik et al., 2023). At the operational level, following Bloom et al. (2012), these AI-driven nudges may enhance firm-level productivity by transitioning heritage management from reactive labour to automated behavioural governance. By effectively nudging visitors toward compliance, organizations reduce the significant operational costs associated with physical site maintenance and environmental remediation. This represents a strategic use of digital intangible assets to drive efficiency in resource-constrained heritage sectors. Moreover, by leveraging AI-driven nudges that emotionally resonate with visitors, heritage managers may improve compliance, reduce vandalism, increase donations, and promote volunteering, ultimately improving resource allocation and productivity outcomes.These digital nudges can be framed using emotional valences (neutral, positive or negative), each of which can activate distinct cognitive and affective processes. To our knowledge, the role of AI in generating these nudges remains unexplored, as well as the impact of AI-driven nudges in promoting responsible tourism.

To explain how AI-driven nudges influence tourist behavior, this study proposes a multi-level theoretical hierarchy that integrates emotional nudging with cultural and technological boundary conditions. The use of GAI also introduces concerns related to perceived cultural accuracy and AI

hallucination. For instance, when AI-generated content is perceived as culturally innacurate, exaggerated, or inauthentic, it can affect emotional engagement negatively and reduce the impact of nudges on behavioral and attitudinal outcomes (Denslinger, 2025). These risks are especially pronounced in heritage sites, wherere authenticity and historical integrity are central to the visitors' experience. Thus, cultural background may moderate sensitivity to such innacuracies, influencing trust in AI-mediated messages and behavioral and attitudinal responses. To explain this phenomenon, we propose a multi-level theoretical hierarchy (see figure 1). At the core is Nudge Theory, which provides the primary mechanism (emotional valences). This process is then conditioned by two distinct layers of boundary conditions: (1) Individual-level factors (Cultural Identity and Perceived Cultural Accuracy), which shape message interpretation, and (2) Technological-level factors (AI Hallucination Potential), which determine the credibility of the intervention. By structuring the study this way, this study advances academic knowledge beyond simple AI adoption models by identifying the specific cultural and ethical friction points that determine nudge success.

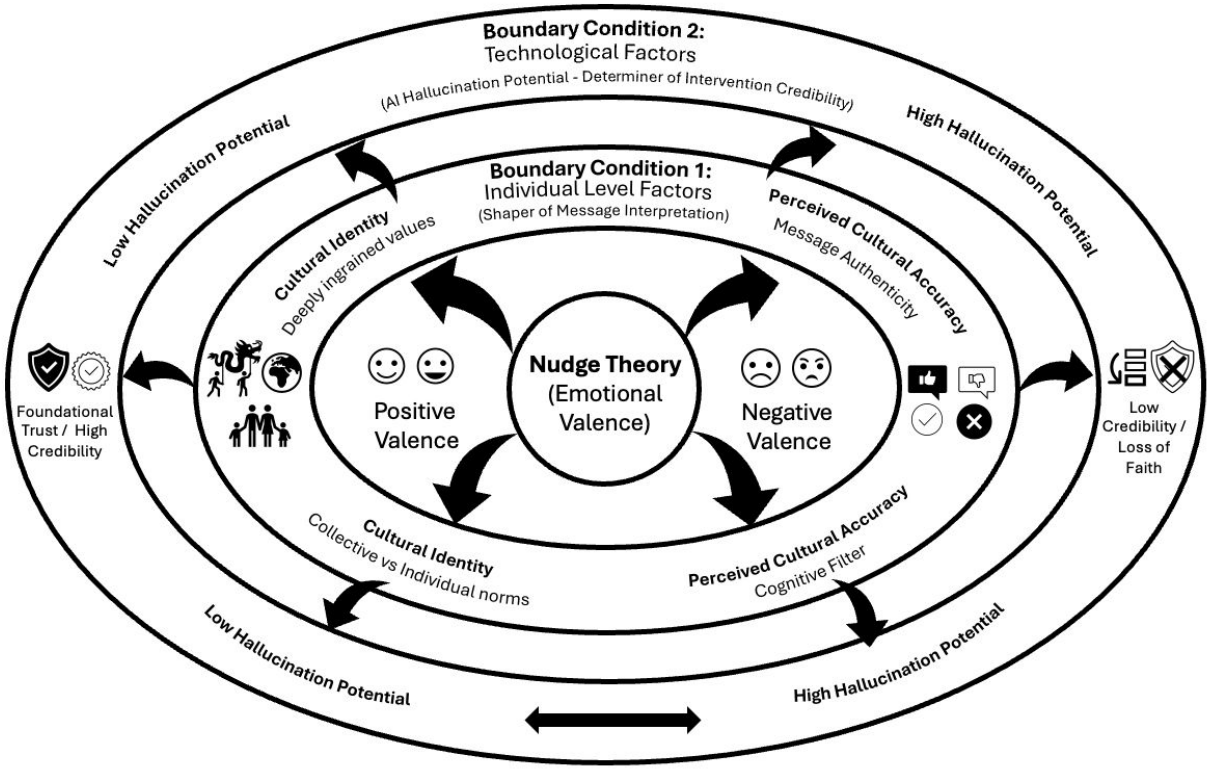


Figure 1: *Proposed Multi-Level Theoretical Hierarchy of AI-Driven Nudges*

At the individual level, emotional responses to AI-driven nudges are culturally contingent, shaping how tourists interpret moral cues and heritage representations. Cultural backgrounds may shape how tourists interpret emotional cues, moral messaging and representations of heritage. Visitors from different cultural contexts may therefore respond differently to the same nudge depending on culturally embedded norms, values, and emotions. India and the United Kingdom sites were selected as contrasting research contexts in this study due to their distinct cultural orientations, stages of economic development, and approaches to heritage tourism governance. India broadly reflects a more collectivist cultural orientation, with strong emphasis on shared cultural identity and heritage preservation, whereas the United Kingdom is often characterized by a more individualistic orientation and highly institutionalized heritage management systems. Examining

these two sites enables a theoretically grounded cross-cultural comparison of emotional AI-driven nudges in heritage tourism. While the findings may not be universally generalizable, they offer analytically transferable insights into how AI-driven nudges operate across culturally distinct tourism environments. By selecting India and the United Kingdom, this study does not merely compare two nations, but investigates a typological contrast between an emerging economy with an interdependent/collectivist cultural orientation and a developed economy with an independent/individualistic orientation. This dual-context approach provides a theoretical framework that is analytically transferable to other regions sharing similar cultural or institutional profiles, such as other South Asian or Western European contexts, thereby extending the study's relevance beyond its immediate geographical scope. In the context of heritage tourism, this might imply that identical AI-driven nudges may impact on tourists from India and United Kingdom differently, even when exposed to the same heritage negatives. For example, negative nudges may be perceived as motivating and norm-reinforcement in some cultural context, when being interpreted as confrontational or innappropriate in others. Similarly, positive and neutral nudges may differ in their ability to elicit emotional engagement and behavioral compliance across cultures. Given the global proliferation of Generative AI in the tourism sector, establishing these culturally-contingent benchmarks is essential for developing ethical and effective digital interventions worldwide. Guided by this framework, the study addresses the following research question: How do AI-driven nudges with different valences (negative, neuttral, and positive) influence tourists´ emotional responses and engagement with heritage sites, and how do these effects differ between tourists based on cultural identity and perceived AI authencitity?

To empirically examine this multi-level framework, this study adopts a mixed-methods approach combining content analysis, qualitative insights, and experimental survey data to examine how

generative-AI-driven nudges function as innovative management practices capable of improving visitor engagement and promoting responsible tourism behaviors. To contribute to the current body of knowledge with robust findings, authors carried out a 3-study investigation. The research began with a content analysis using InfraNodus, examining 262 articles gathered from a public domain through web scraping surrounding responsible tourism, leading to the identification of five key themes. By analyzing mechanisms across two cultural contexts (India and the United Kingdom), the study contributes to discussions on cross-country differences in innovation deployment and managerial effectiveness at varying stages of economic development. The themes informed subsequent research stages, including 25 in-depth interviews which further gave us insight on the factors influencing emotional response towards cultural heritage tourism. These two stages informed the contextual framing of the study and supported the selection and operationalization of theoretically grounded constructs drawn from prior literature, which subsequently guided the development of the conceptual framework and hypotheses. For the third stage, we carried out an experiment combined with a survey to test the hypotheses. The findings of the content analysis, interviews, experiment and survey were validated with expert insights gathered from personal interviews with subject experts. The findings advance theoretical and managerial understanding of how organizations can strategically integrate innovation, intangible digital assets, and behavioral-monitoring practices to enhance the productivity and sustainable management of cultural heritage resources. This study contributes to the literature in three ways. First, rather than focusing solely on who constitutes a responsible tourist, it examines how digital choice architecture, through AI-driven nudges, can shape responsible behaviour. This extends prior work on responsible tourism and digital nudging by providing empirical evidence of behavioural influence mechanisms within a cultural heritage context (e.g., Knani et al., 2022). Second, the study integrates Message Framing

Theory with Cultural Dimensions to move beyond "one-size-fits-all" AI implementations, demonstrating how culturally contingent emotional responses influence engagement outcomes. Third, the study provides initial empirical insight into the role of AI hallucination as a potential psychological barrier to behavioural compliance in heritage tourism, highlighting an underexplored tension between emotional persuasion and informational accuracy.

2. Literature Review and Hypotheses Development

2.1.1. Theoretical Foundation: Nudge Theory

This study adopts nudge theory to elucidate the process through which AI-driven nudges influence engagement towards responsible tourism. Thaler and Sunstein (2008, p.6) define nudges as *´any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives´*. While this definition emphasizes structural modifications to choice architecture (e.g. defaults, ordering, or salience), following research has extended the concept of nudging to include message-based and informational interventions, particularly in digital environments. In such contexts, nudges may operate through emotionally framed or persuasive messages that influence attention, affect, and judgment without altering the formal set of available choices (Weinmann et al., 2016; Mirbabaie et al., 2021). Furthermore, nudge theory is based on dual-system principles that influence the consumer decision-making process (Thaler et al., 2008). The reflective system operates consciously, is directed, and follows analytical reasoning, whereas the automatic system is involuntary, associative, and relies on judgmental heuristics (Thaler et al., 2008). Nudge theory

suggests that the most effective approach to influence individuals is by targeting the automatic system through subtle messaging (Thaler et al., 2008).

In the field of psychology, nudge theory has gained prominence as a key framework for understanding how positive reinforcement and subtle, indirect messaging can influence decisions and behaviours at an individual and group level. Rather than relying on direct bans or penalties to enforce change, nudge theory suggests that desired outcomes can be achieved by subtly guiding individuals towards the social desired behaviour (Thaler et al., 2008). This approach capitalizes on cognitive and heuristic biases, which often result in irrational judgments and sub-optimal choices (Carrel et al., 2023). By strategically leveraging these biases, individuals are subtly guided toward making better decisions, increasing the likelihood that they will voluntarily engage in behaviour change (Hortal, 2020; Balanay, 2023). In essence, nudges are usually timely, easy, social and rewarding (Banerjee et., 2023) and can effectively influence short-term behavioural changes (Barbosa et al., 2024). Research also indicates that the effectiveness of nudges depends significantly on their context (Banerjee et al., 2023). Specifically, recent scholarship has moved beyond the homogenous assumption to identify critical boundary conditions that dictate nudge success or failure. For instance, Berger et al. (2022) demonstrate that digital nudges can trigger psychological reactance, a defensive pushback, if visitors perceive the AI intervention as an infringement on their autonomy or freedom of choice. This is further complicated by nudge fatigue in digital environments; as noted by Mirbabaie et al. (2021), the constant stream of digital information can lead to cognitive overload, causing users to ignore even well-framed messages. Furthermore, Nowak et al. (2024) and Olya et al. (2024) document significant variability and

inconsistent behavioral effects based on the user's prior level of environmental commitment. These findings suggest that a nudge's impact is not universal but is filtered through the user's existing moral foundations and their perception of the digital platform's intrusiveness. Given the diverse ethical bases for supporting nudges, it is essential to connect these nudges with consumers' core moral values (Chowdhury, 2022).

Research classifies nudges in different ways. For instance, Hansen and Jespersen (2013) identify four categories: reflective and transparent nudges (e.g. green arrows encouraging stair use); automatic and transparent nudges (e.g. calming music played during boarding); reflective but non-transparent nudges (e.g. posters with human faces to boost norm compliance); and automatic, non-transparent nudges that manipulate behaviour (e.g. altering plate shapes to reduce calorie intake). Nudges are also categorized by their target. For example, Hagman et al. (2015) distinguish between pro-social nudges, which benefit society (e.g., organ donation defaults), and pro-self-nudges, which benefit individuals (e.g., graphic warnings on cigarette packs). Another approach by Felsen et al. (2013) classifies nudges as either covert (unconscious influence) or overt (conscious influence). Weinmann et al. (2016, p.432) broadened the concept of nudging by emphasizing its application to digital contexts and conceptualized digital nudging as the ´use of user-interface design elements to guide people's behaviour in digital choice environments´. Digital nudges were investigated in the field of environmentally sustainable behaviour (Berger et al., 2022) social media disaster communication (Mirbabaie et al., 2021), aviation-related carbon emissions (Meske et al., 2024), food waste reduction (Ong et al., 2023), and education (Tate, 2023). Overall, nudging has been widely applied across various fields, including medicine, financial well-being, healthcare,

education, and social media (e.g., Abumalloh et al., 2024). However, its use in tourism remains relatively underexplored (e.g., Taylor, 2023), with most research in this area focusing on climate change and promoting sustainable behaviours (e.g., Olya et al., 2024). A comprehensive summary of these studies and their contributions to the current research is provided in the literature review table in Appendix A. Moreover, there is a growing interest in uncovering the underlying mechanisms that drive the positive effects of nudges on tourist behaviour (Liu et al., 2024).

While traditional nudge theory conceptualizes nudges as subtle modifications to choice architecture that guide behaviour without restricting freedom of choice, most existing nudges are static interventions embedded in interface design or policy environments (Taylor, 2023). Generative AI extends the theoretical boundaries of traditional digital nudging in three fundamental ways. First, whereas conventional digital nudges rely on static interface elements such as defaults, reminders, visual cues (Weinmann et al., 2016), GAI enables dynamic generation of persuasive content that adapts to user context an interaction in real time (Dwivedi et al., 2023). Second, GAI introduces algorithm personalization, allowing nudges to be tailored to individual cultural identities, emotional predispositions and prior digital behaviours (Lim et al., 2025). This moves nudging from a uniform behavioural intervention towards a micro-targeted behavioural influence mechanism. Third, generative systems introduce epistemic uncertainty, because the content they produce may include fabricated or culturally distorted information, commonly referred to as AI hallucinations (Christensen etal., 2024). Unlike traditional nudges that modify the structure of the choice environment, GAI driven nudges operate simultaneously at the content, emotional and informational levels, thereby expanding the nudge theory beyond interface design towards algorithmically medicated persuasion.

2.1.2. Generative AI-driven Nudges and Emotions

In this study, we used Generative AI to generate positive, negative, and neutral messages to examine the impact of nudges in eliciting positive and negative emotions toward responsible tourism. Specifically, the nudges employed in this study take the form of emotionally framed persuasive messages delivered digitally, rather than structural modifications to the choice environment, and are therefore conceptualized as message-based digital nudges. We adopted Hollebeek et al.'s (2024) definition of Generative AI acknowledging that it is *'used to create novel, original, or creative (e.g., textual/image-based) content (e.g., ChatGPT/Copy.ai'* (Dwivedi et al., 2023). Generative AI's ability to produce diverse and contextually relevant text makes it a valuable tool for experimental design (Brown et al., 2019). Its application allows researchers to rapidly generate varied stimuli, facilitating controlled studies on consumer responses (Kaplan et al., 2019). Generative AI has the potential to be a powerful tool to engage consumers and address their emotional needs (Bagozzi et al., 2022). By generating varied textual content, it allows for the exploration of diverse emotional responses within a controlled experimental framework.

The concept of AI nudges is explored in the literature as subtle design interventions designed to encourage users to make decisions that are perceived as beneficial for both individuals and society (Williamson and Prybutok, 2024). This perspective aligns with extant research in advertising that stresses the link between emotional persuasive appeals and prosocial behaviour (e.g. Kemp et al., 2013). The emergence of AI in the domain of marketing sparked a subsequent wave of academic research that raised significant ethical concerns due to their potentially manipulative nature (Williamson et al., 2024). Moreover, there is a rising awareness of the need to understand the

pivotal role of emotional responses to artificial intelligent technologies (Hollebeek et al., 2024; Soon et al., 2023) and its application to marketing (Mehta et al., 2022). Consistent with this conceptualization, the hypotheses developed in this study do not aim to test nudge theory in its narrow choice-architecture form. Instead, they examine whether emotionally framed AI-generated messages - conceptualized as digital nudges - systematically influence emotional responses and engagement. Accordingly, the hypotheses focus on framing and affective mechanisms rather than structural choice manipulation. Consequently, we infer that Generative AI-driven Nudges can significantly influence individuals' emotional responses in a subtle and persuasive manner. This inference directs the formulation of the subsequent hypothesis:

H1: *Nudges delivered through Generative AI will significantly influence the Emotional Responses*

Message framing theory refers to how people's reactions and feelings about a message are influenced by how the information is presented (Kahneman, 2011). Research has demonstrated that individuals respond differently to the same information depending on whether it is formulated in terms of positive outcomes (wins) or negative outcomes (setbacks) (Tversky and Kahneman, 1981). One stream of research suggests that the success of positively framed advertising is significantly heightened when consumers experience positive emotions, such as happiness. Conversely, this effect weakens when consumers feel sadness, an emotion associated with unpleasantness and uncertainty (Grigorios et al., 2022). This perspective is also shared by Grappi et al. (2024), who demonstrated that positive message framing is more effective in promoting sustainable fashion consumption among younger generations. Additionally, Yoon et al. (2019) found that gain-framed messages promoting responsible tourism are more effective than loss-

framed ones. Other scholars claim that negatively framed messages are particularly effective in promoting responsible behaviour, as they evoke negative emotions (e.g. fear, guilt and shame) that motivate individuals to adopt coping behaviours to restore a positive self-image (Amatulli et al., 2019; Brennan and Binney, 2010). This highlights a significant theoretical tension regarding nudge valence in tourism. While Grappi et al. (2024) argue that positive framing is superior for hedonic consumption (like fashion or leisure) because it sustains a 'feel-good' factor, Amatulli et al. (2019) contend that negative framing is more potent for moral compliance. This study bridges this contradiction by applying GAI to determine if hyper-personalized negative imagery, such as the visual hallucination of a site's degradation, can override the typical preference for positive reinforcement in heritage contexts. Research also indicates that negative emotional responses are culturally dependent, with individuals from Latin American cultures exhibiting a stronger emotional reaction to fear-based communication compared to those from European cultures (Mas et al., 2024). In our model, negatively framed AI nudges are expected to evoke emotional responses that encourage responsible tourism (Yang et al., 2018). Building on previous research demonstrating the effectiveness of negative framing (Grappi et al., 2024), we hypothesize that:

H2*: The type of nudge delivered through Generative AI (GAI) will influence the valence of emotional response, such that negative nudges will elicit more negatively valenced emotional response compared to positive and neutral nudges.*

It is important to clarify that H2 focuses specifically on differences in emotional valence across nudge types, rather than directly testing behavioural effectiveness. While prior literature suggests that negatively framed messages may be more effective in promoting pro-social or responsible

behaviours by eliciting emotions such as fear or guilt (Amatulli et al., 2019; Brennan and Binney, 2010), the present study conceptualizes effectiveness as a downstream outcome that operates through emotional and engagement mechanisms. In this framework, negatively valenced emotional responses are not assumed to be inherently desirable; rather, their effectiveness depends on their ability to increase engagement and subsequently promote responsible tourism behaviour. Therefore, H2 captures the emotional differentiation mechanism, while the effectiveness of these emotional responses is examined through the structural relationships proposed in H3 and H4.

H1 and H2 address conceptually distinct research questions and were therefore tested at different analytical levels. H1 examines the existence of an effect of Generative AI–driven nudges on emotional responses, assessed through between-group comparisons across experimental conditions. In contrast, H2 focuses on the differential impact of framing valence (positive versus negative nudges) and is examined through comparative analysis within the nudge conditions. The underlying idea is that, if the nudge frame elicits stronger emotional responses (including negatively valenced emotions), these may enhance engagement, which in turn can influence responsible tourism behaviour. Consequently, while both hypotheses relate to emotional responses, they are not collapsed into a single causal test.

2.1.3. The Causal Path: Emotions, Engagement, and Responsible Tourism

Emotions serve as the primary conduit through which tourists interpret heritage value and form long-term loyalty (Hosany et al., 2020). Beyond mere reaction, consumption emotions act as a mediator between perceived service fairness and behavioral intentions in heritage settings (Su and Hsu, 2013). This suggests that the emotional state of the visitor is not a static outcome but a dynamic psychological mechanism that dictates how information is processed. By triggering

specific affective states, managers can transition a passive visit into a mindful heritage experience, where emotional resonance drives the desire for preservation and site stewardship (Rasoolimanesh et al., 2019; Yi et al., 2022). Furthermore, the intensity of these emotional responses directly governs the level of cognitive and behavioral immersion. Tourism research has emphasized that responsible tourism behaviours are more likely to increase when tourists feel strongly engaged with a destination (Hu and Sung, 2022). Indeed, engaging with a heritage destination is essential for tourist engagement and entails sharing and exchanging ideas, reflections, and emotions about one's experiences with the destination, as well as with other consumers, locals, or stakeholders (Rasoolimanesh et al., 2019; Vivek, 2009). When a nudge successfully evokes a self-transcendent emotion such as awe or responsibility, it expands the user's cognitive focus from personal enjoyment to collective preservation. Research also shows that positive emotions have a direct and significant influence on tourists' satisfaction, destinations revisit intentions and WOM referrals of cultural heritage sites (Su and Hsu, 2013). Considering these discussions, the hypothesis is presented as follows:

H3*: Emotional Responses derived from the nudges will significantly influence Engagement towards Cultural Heritage Tourism (CHT)*

2.1.4. Responsible Tourism as a Behavioral Outcome

The objective of responsible tourism is, by definition, to alter the way in which businesses, tourists and other stakeholders behave, encouraging them to become 'responsible' (Holden et al., 2013). Evéil (2010) explains that tourism that adopts practices respectful of both the natural and cultural

environment contribute ethically to local economic development (Sharpley, 2012). These practices also raise tourists' awareness of their own impact on the local area, turning them into active participants in responsible tourism. Substantial attention has been paid to the need for a transition from tourism that prioritizes market value and adopts a *laissez-faire* stance on environmental issues, to one that is guided by both environmental and social values (Mihalic, 2016; Gao et al., 2024). For example, the Chinese Tourism Bureau introduced guidelines in 2006 to encourage responsible tourist behaviour and reduce conflicts between hosts and Chinese visitors (Gong et al., 2019). These guidelines reflect the growing recognition of the importance of integrating environmentally ethical behaviour as a fundamental aspect of responsible tourism (Gong et al., 2019; Nguyen et al., 2024). This ethical approach not only enhances visitor satisfaction but also increases the likelihood of return visits and positive word-of-mouth recommendations (Mathew et al., 2024). However, responsible tourism is dynamic and context-dependent, varying significantly across different countries (Gong et al., 2019), which requires an understanding of local identities and cultures. Aligning with the view that responsible tourism is an ideological and socio-cultural construct (Burrai et al., 2019), we argue that tourists who are emotionally engaged in cultural heritage tourism are more likely to adopt responsible tourism behaviours. Hence, we hypothesize that:

H4: *The Engagement in Cultural Heritage Tourism (CHT) will significantly enhance responsible tourism*

2.1.5. Cultural Identity

Cultural identity pertains to the degree to which individuals within a particular culture acknowledge and connect with key elements that distinguish their culture from others (Clark, 1990). This concept is considered as a fundamental form of national identity, as it emerges from shared historical understanding and is shaped by cultural influences (Yang et al., 2022). In essence, cultural identity represents how cultural heritage is incorporated into an individual's sense of self, making it distinct from other identity categories such as race, birthplace, or religion (Cleveland et al., 2009; He and Wang, 2015). This internalized heritage identity is a key predictor of purchase intentions and pro-social behaviors across different cultural landscapes (Zhang et al., 2023; Fu and Luo, 2023). Grounded in the self-schema theory of Kitayama et al. (2006), individuals from interdependent cultures (e.g., India) are more likely to respond to heritage nudges that emphasize communal continuity, whereas those from independent cultures (e.g., UK) prioritize personal relevance and historical authenticity (McIntosh et al., 2002). Drawing on Message Framing Theory (Tversky et al., 1981) and Hofstede's Cultural Dimensions (Hofstede, 2003), the effectiveness of these digital nudges is likely conditioned by the degree of Cultural Congruence. In high-collectivist societies such as India, nudges emphasizing 'Social Influence' and 'Communal Legacy' align with an interdependent self-schema. In contrast, in more individualistic contexts like the UK, nudges focusing on 'Personal Agency' or 'Individual Loss' (e.g., loss-framed messages) may be more persuasive. By integrating these dimensions, this study extends beyond the 'one-size-fits-all' AI adoption models found in earlier tourism research, such as Knani et al. (2022). Within AI-mediated communication environments, message framing and cultural interpretation interact in ways that may produce unintended psychological responses (Li et al., 2026). Specifically, when AI-Generated nudges are perceived as cultural misaligned or exaggerated, individuals may

experience reactance (Gong et al., 2024), a motivational state triggered when persuasive attempts threaten perceived autonomy or authenticity. In heritage tourism contexts, such reactance may be amplified when AI-Generated content is perceived as historically inaccurate or culturally insensitive (Bui et al., 2024). This creates a novel theoretical mechanism in which AI hallucination interacts with message framing, potentially transforming persuasive nudges into counterproductive interventions. Consequently, the effectiveness of GAI driven nudges depends not only on the valence of the frame (positive vs negative) but also on the cultural credibility of the generated content, which shapes emotional responses and engagement outcomes (Li et al., 2025).

As such, cultural identity functions as a shared connection among individuals, uniting people through shared historical and cultural legacy (He and Wang, 2015). Most tourism studies focus on the impact of cultural identity on travel decisions, revisit intentions, and place attachment (e.g. Fu and Luo, 2023). For instance, empirical studies examining the relationship between cultural identity and purchase intentions for intangible heritage artifacts show that this effect is stronger among consumers who possess knowledge related to those artifacts (Zhang et al., 2023). In the context of our study, we argue that cultural identity is particularly significant in collectivist cultures like India, where individuals often define their self-concept or self-schema through their connections with others (He and Wang, 2015). Given India's rich cultural heritage, which is deeply valued by individuals, the impact of cultural identity on consumer behaviour is likely to be stronger compared to individualistic Western societies (He and Wang, 2015). Furthermore, cross-cultural studies indicate that acceptance of nudge policies varies between countries. For example, Hagman et al. (2015) found that nudge policy acceptance was generally high in Sweden and USA, with

Swedes showing slightly higher acceptance than Americans. Interestingly, despite this high acceptance, many individuals also perceived nudge policies as somewhat intrusive and restrictive of personal freedom. Moreover, pro-social nudges were significantly less accepted than pro-self-nudges. One explanation for this difference is Sweden's long-standing tradition of an effective and robust welfare system, which encourages inclusivity in the public sector, whereas the United States has historically prioritized liberal values centered around personal freedom (Hagman et al., 2015). In the view of these results, we propose that cultural identity plays a key role in shaping how Generative AI-driven nudges are framed, as they elicit different emotional responses based on forms of collective identification that bond people together. Formally, we hypothesize that:

H5: *Cultural Identity will moderate the relationship between nudges delivered through Generative AI and Emotional Responses*

2.1.6. AI Hallucination Potential

AI hallucination is conceptualized as *´the phenomenon in which generative Ai software systems generate fabricated or false information´* (Christensen et al., 2024, p. 4). Beyond simple factual errors, hallucinations represent a fundamental epistemic risk which is a breakdown in the reliability of AI as a knowledge-bearing agent. As argued by Bender et al. (2021), these 'stochastic parrots' lack any underlying semantic understanding, meaning that hallucinations are not mere errors but structural failure modes inherent to probabilistic text generation. This is supported by Marcus and Davis (2019), who highlight the structural inability of current GAI architectures to maintain internal cognitive models of reality, leading to outputs that are syntactically perfect but factually

untethered. In the context of heritage tourism, this creates an epistemic threat to historical integrity; if the AI produces content with no regard for the truth, it potentially erodes the very historical authenticity that gives heritage sites their value (McIntosh et al., 2023). Consequently, hallucination is not just an ethical friction point but a technological boundary that fundamentally limits the credibility of AI-mediated nudges (Christensen et al., 2024; Sun et al., 2024). AI hallucinations can manifest in several different ways, ranging from factually incorrect information, nonsensical responses, biases or stereotypes or irrelevant content (Williamson et al., 2024). The potential for AI to generate false data raises significant moral and ethical concerns among both scholars and practitioners (Brewer et al., 2024). The human-like capabilities of AI have sparked extensive research, as scholars anticipate that generative AI will evolve into a knowledge-enhancing and capability-enabling tool (Brewer et al., 2024). However, this development highlights the need for strict regulation to prevent the manipulation of human decisions and the exploitation of cognitive vulnerabilities (Williamson et al., 2024). The importance of addressing these concerns is highlighted by proposals to integrate blockchain technologies to promote transparency, monitoring, verifiability, and decentralization in AI's use (Brewer et al., 2024). A growing area of concern is AI's selection of data, as it currently lacks the ability to distinguish between accurate and inaccurate information, or real data from fabricated data (Brewer et al., 2024; Sun et al., 2024). AI hallucinations present a significant risk, as they can result in misleading or entirely false outputs (Brewer et al., 2024). In this context, it could be argued that ethical and moral concerns underscore the need for responsible AI practices and critical thinking (Williamson et al., 2024; Hicks et al., 2024). Specifically, when employing GAI to generate nudges, human oversight is crucial for critically assessing the creative output of AI systems (Brewer et al., 2024). In

summary, the integration of AI control mechanisms and human ability to detect when AI is manipulating decisions is vital for mitigating the risks associated with AI-driven manipulation (Williamson et al., 2024). Moreover, research indicates that the ability to recognize potential AI manipulation is influenced by individual differences in cognitive abilities, familiarity with AI technologies, and personal mental models of how AI systems function (Williamson et al., 2024). Hence, given that humans may detect AI´s attempts to manipulate their emotions and engagement towards cultural heritage tourism using fabricated or false information, we hypothesize that:

H6: *AI hallucination potential will moderate the relationship between nudges delivered through Generative AI and Emotional Responses*

H7: *AI hallucination potential will moderate the relationship between emotional response and Engagement towards Cultural Heritage Tourism (CHT)*

2.1.7. Perceived Cultural Accuracy

Perceived cultural accuracy refers to the extent to which individuals believe that a representation (e.g., in media, tourism, or heritage sites) authentically reflects the traditions, values, and characteristics of a particular culture. The term ‘authentic’ also encompasses meanings such as ‘veritable,’ ‘bona fide,’ ‘genuine,’ ‘reliable,’ ‘original,’ and ‘unquestionable. (Park et al., 2019). In the context of heritage tourism, authenticity is linked to an historical time and place that will be interpreted by individuals or groups as part of a social ecosystem (Park et. al., 2019). In particular, research shows that the perceived cultural accuracy is strengthened by the tangibility of cultural tourism elements which offer tourists a more compelling and authentic tourism experience (Park

et al., 2019). In fact, an increasing demand for heritage-based tourism is explained by a growing awareness of heritage sites combined with tourists' psychological and social needs associated with consumption of heritage (Waitt, 2000). As such, tourists are prone to relate emotionally to cultural heritage sites that are authentical historical ambiences (Waitt, 2000; Park et al., 2019). Building on these findings, we argue that perceived cultural accuracy plays a moderating role in how tourists emotionally engage with AI-driven nudges and how this emotional response influences engagement towards cultural heritage tourism. Therefore, we formally propose the following hypothesis along with a conceptual framework in Figure 2:

H8: *Perceived cultural accuracy will moderate the relationship between nudges delivered through Generative AI and Emotional Responses*

H9: *Perceived cultural accuracy will moderate the relationship between emotional response and Engagement towards Cultural Heritage Tourism (CHT)*

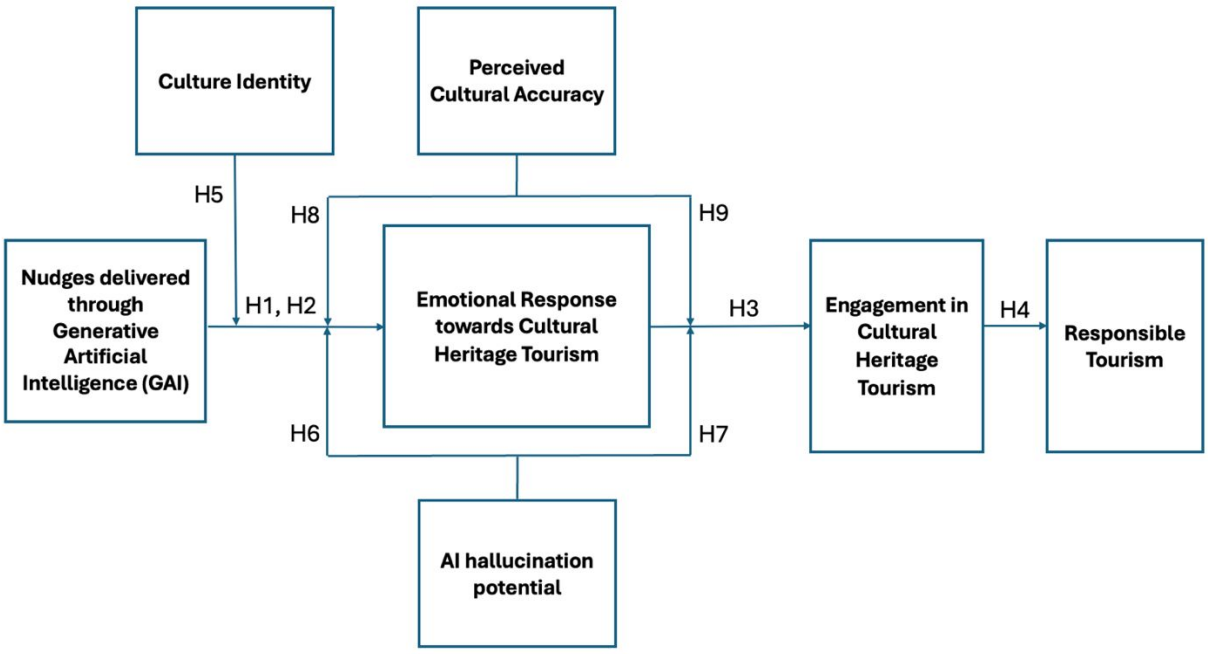


Figure 2: *Conceptual Framework*

Methodology

Combining quantitative and qualitative methods offers a more comprehensive understanding of the research problem (Greene et al., 1989; Teddlie et al., 2011). Due to the very limited amount of prior research done in the domain of application of emotions on responsible tourism, the current article comprises of three studies. The first is analysis of content on the internet through web scraping, with focus on certain keywords related to responsible tourism. It is followed by a semi-structured interview to gain an insight on the key constructs that may have a bearing on the decision process of a person considering responsible tourism to a heritage site. The first two studies were then used to develop a theoretical framework that could be used to predict responsible tourism, along with the role of various moderators. Study 3 used experimentation and survey design, to

empirically understand the role of the various predictors and moderators on responsible heritage tourism.

Study 1

InfraNodus was used to identify the themes surrounding responsible tourism from 262 news articles from the past 6 months. It helped us uncover hidden connections and insights into the evolving landscape of responsible tourism. It is imperative to distinguish the functional role of the media-derived data from the study's theoretical architecture. The corpus-based analysis via InfraNodus was employed neither for inductive theory building nor for the conceptualization of latent constructs. Rather, this procedure functioned as a methodological bridge to enhance ecological validity, providing a lexical and thematic baseline for the development of experimental stimuli. By utilizing real-world discourse to inform the nudges, the study ensured that the stimuli were representative of extant cultural heritage narratives. Conversely, the behavioral constructs and psychometric instruments utilized to measure participant responses were derived exclusively from established literature (e.g., Lazarus, 1991), ensuring that the internal validity of the study remained independent of the exploratory media analysis. The themes were generated by a "betweenness centrality" option in InfraNodus which ranks the words or phrases in a text network based on their contextual importance. The news articles were analyzed through a community detection algorithm, which identifies words that frequently co-occur and represents them as nodes in a network – the connections between the words were depicted as lines or curves showing their co-occurrences. Instead of relying on a distributional model, InfraNodus uses graph theory principle to generate these visualizations (Ortiz, 2023). Words that are more influential, as

determined by their "betweenness centrality," are displayed as larger nodes on the graph. Words that appear together often are grouped into thematic clusters, with different colors indicating their community, while word similarity is used to derive higher-level meanings. InfraNodus thus enables the identification of these higher-level meanings without researcher bias, relying instead on the automatic analysis of the text.

Results for Study 1

Main Topics and Influential Discourse Elements

Table 1 presents the first 5 main topics that emerged from the InfraNodus analysis. The table categorizes the central words for each identified theme, showcasing the concepts that news articles frequently discussed in relation to tourism.

Topical Cluster	Influence	Total Nodes	Main Topic	Keywords	Interpretation
1	58%	35	Responsible Tourism	Responsible, travel, initiative, project, destination, community, sustainable, practice, launch, state, inclusive, enterprise, implement, goal, development, disability, support	Focus on ethical tourism practices and environmental concerns especially reducing tourism's ecological impact.
2	23%	47	Cultural Heritage	Local, heritage, preserve, community, cultural, experience, visitor, enhance, storytelling, history, empowerment, site, foster, region, rewarding, encourage, unique, traditional	Emphasis on promoting and protecting cultural assets for tourism.
3	11%	28	Digital Engagement	Tourist, platform, engagement, experience, customer, digital, influencer, storytelling, history, feedback, post, review, user, social, media, integration, global, education, reach, market, content, international	Involvement of digital media for engaging tourists in responsible and sustainable tourism practices.
4	4%	5	Technological Innovation	Discovery, trends, activity, technology, digital, age, future, research, industry, development, AI	Role of technology in enhancing tourism experiences.
5	4%	9	Tourism Promotion	Marketing, promote, media, organization, attraction, industry, destination, place, tour, guide, social,	Initiatives to promote local heritage sites for tourism

Table 1: *Main Topics with keywords derived from InfraNodus*

Furthermore, following graphs (Figure 3) represent the Influential Discourse Elements containing the betweenness centrality of words. With a higher betweenness centrality among all other words, the first 12 influential words with higher frequency depict the 5 key themes generated by InfraNodus. With *tourism, responsible and sustainable* being in 'Responsible Tourism' cluster, *local, heritage and cultural* in 'Cultural Heritage' cluster, *experience, tourist and engagement* in 'Digital Engagement' cluster, *travel and initiative* in 'Tourism Promotion' cluster and lastly *technology* in 'Technological Innovation' cluster.

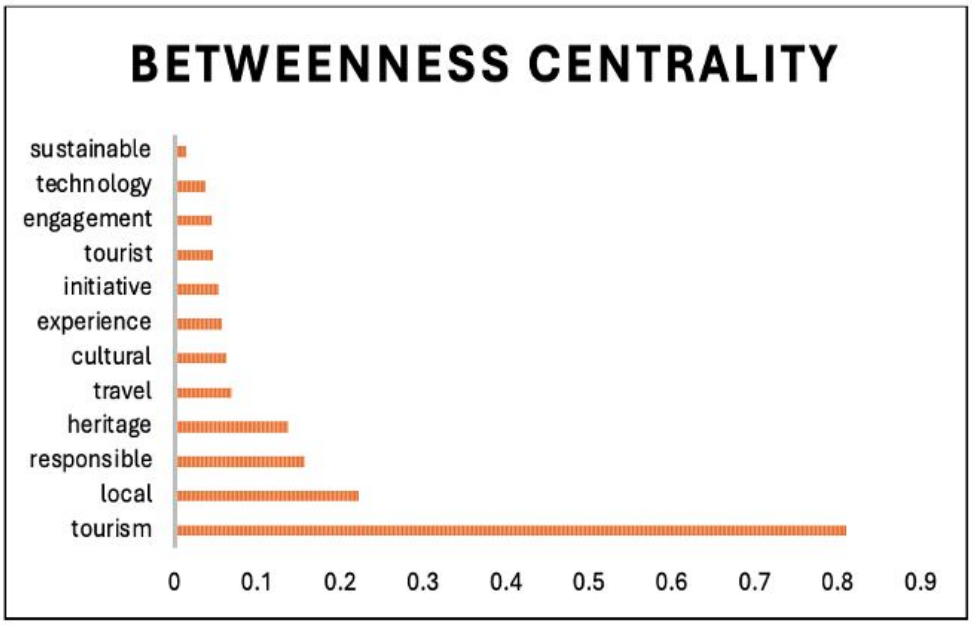


Figure 3: *Betweenness Centrality of Frequently Used Words*

Sentiment Analysis

The sentiment analysis of the respondent data, as shown in Figure 4, reveals the overall tone associated with the themes discussed. The sentiment analysis was conducted using BERT's AI model embedded in InfraNodus that classifies text as positive, negative, or neutral. The chart

indicates the distribution of these sentiments across the dataset. 78% positive sentiments are associated with the themes of responsible tourism, reflecting optimism about eco-friendly practices and community development. 8% neutral sentiments are prevalent in discussions around cultural heritage, suggesting an objective focus on the preservation of tradition. Whereas 14% negative sentiment, though less frequent, appears in discussions around the impact of tourism on the environment and local cultures, often highlighting concerns about over-tourism or exploitation and lack of initiatives for promoting responsible tourism.

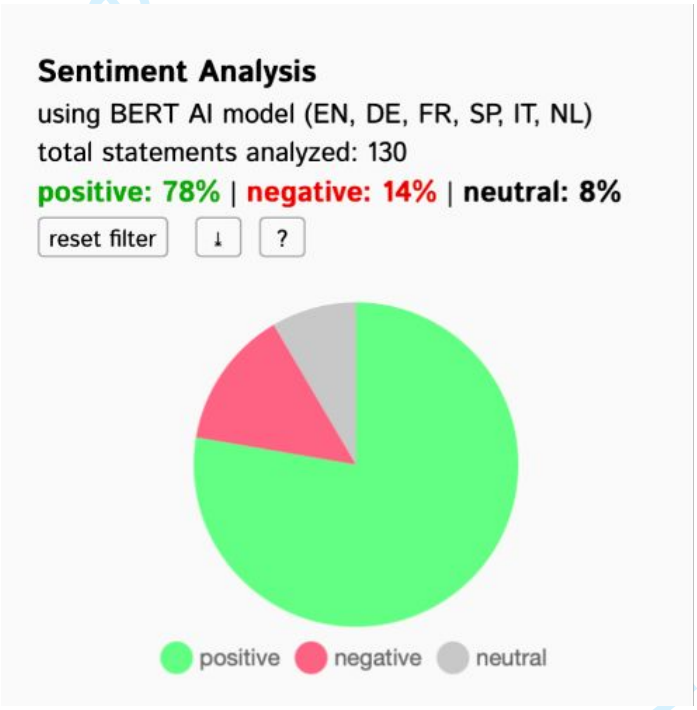


Figure 4: *Sentiment Analysis using BERT built-in InfraNodus*

Abbreviations: BERT – Bidirectional Encoder Representations from Transformers; EN – English; DE – German; FR – French; SP – Spanish; IT – Italian; NL – Dutch languages

Thematic Analysis via Nodes

The nodes generated through InfraNodus in Figure 5, represents a rich network of connections that illustrates key clusters within the discourse on tourism, particularly focusing on *Responsible*

Tourism, Cultural Heritage, Digital Engagement, and Technological Innovation (AI) and Tourism Promotion. These thematic clusters reflect the multifaceted nature of contemporary tourism research, which increasingly emphasizes responsibility, sustainability, digital transformation, and the integration of technological innovations like AI.

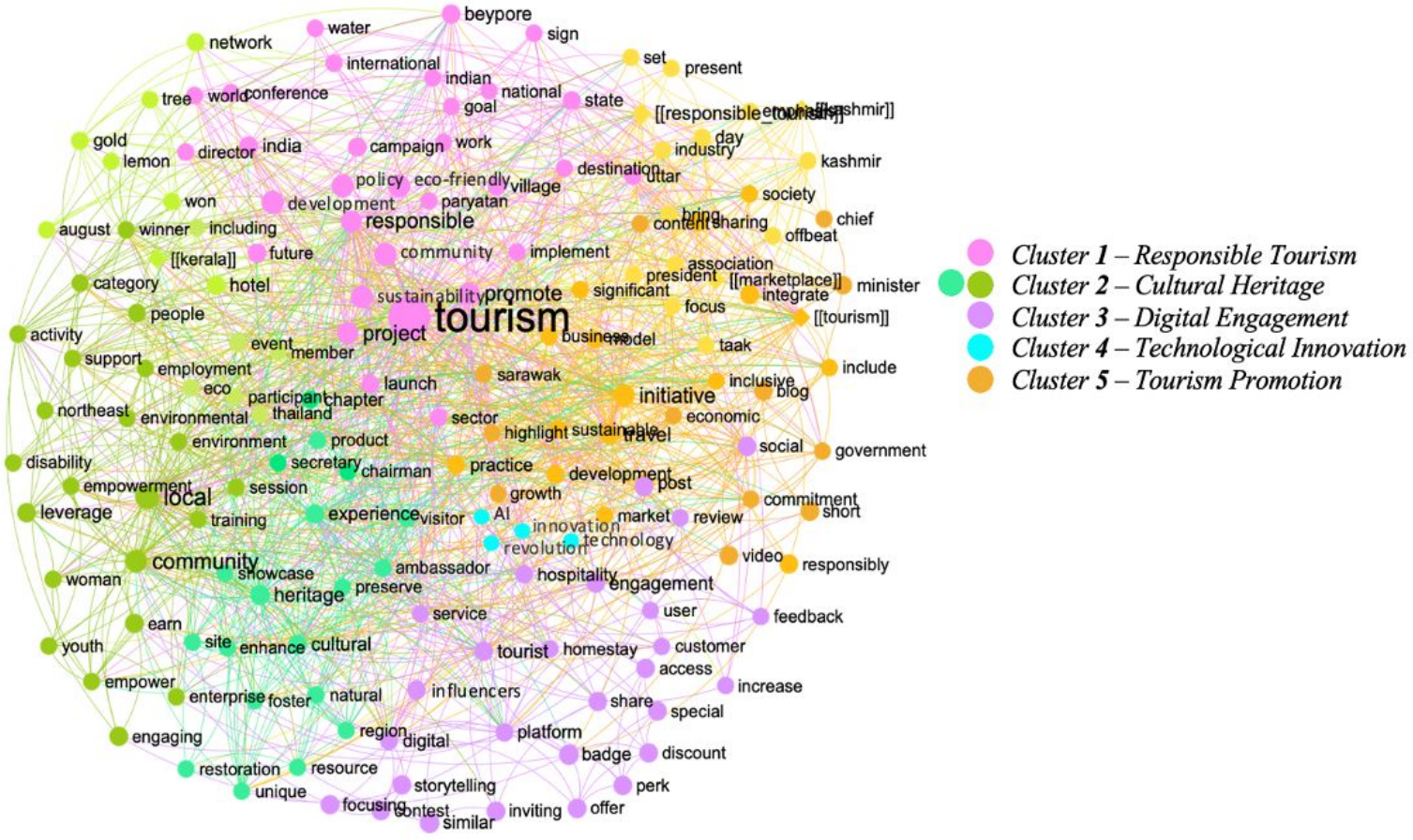


Figure 5: *Nodes representing 5 distinct themes generated by InfraNodus*

1. *Responsible Tourism*

As highlighted by its central positioning in the network, *responsible tourism* emerges as a dominant concept in the discourse, connected to various subtopics such as *cultural heritage*, *tourism promotion, technological innovation, and digital engagement.* This indicates a growing recognition of responsible tourism's significance in both academic and industry discussions (Chen et al., 2021). From the analysed news articles it was evident that responsible tourism is fairly discussed in the industry, however, initiatives to promote and aware tourists about sustainable yet responsible tourism practices is still lacking. The high betweenness centrality of responsible tourism, reflected in the larger node size, indicates its pivotal role in connecting various sub-concepts, confirming its centrality to the discussion. The strong connectivity between responsible tourism and other related concepts like 'sustainability' and 'community' reveals a multifaceted understanding of the term, where tourism is not just a vehicle for economic gain but also for environmental protection and social responsibility. This finding suggests that destinations may improve their priorities and support local sustainable development by interacting with their communities and using collective intelligence (Kutty et al., 2020). According to Tursunkulova et al. (2024), nodes with higher betweenness centrality often act as bridges between distinct thematic clusters, which suggests that responsible tourism serves as a key framework linking various interconnected ideas in the analysed text.

2. *Cultural Heritage*

Words such as *community, local, cultural and heritage* highlight the emphasis on inclusive development in responsible tourism along with the importance of cultural heritage preservation. This subtheme suggests that responsible tourism is perceived as a way to empower local

communities, not only through economic opportunities but also by preserving their cultural heritage and identity. This approach aligns with the principles of sustainable development, which seek to balance economic growth with social equity and environmental protection (Hall et al., 2014). The discussion around cultural preservation is deeply intertwined with the need to protect and promote local traditions and heritage, ensuring that tourism supports rather than diminishes cultural identities. For example, one article from IHCL's World Tourism Day statement outlines initiatives that safeguard India's intangible cultural heritage in collaboration with UNESCO, reflecting efforts to protect cultural traditions while fostering tourism growth. Similarly, another article discusses the potential negative impact of tourism, such as 'overtourism' leading to protests in places like Barcelona. This points to the delicate balance between tourism development and cultural preservation, where unchecked tourism can threaten local cultural environments (Buitrago-Esquinas et al., 2023). This concern ties into the heritage and preservation nodes, which advocate for safeguarding cultural resources from the adverse effects of mass tourism. The presence of terms like 'preservation' and 'empower' signifies a call to protect indigenous traditions and ensure that tourism benefits extend to local populations. The preservation of cultural heritage is a cornerstone of responsible tourism. By supporting local traditions, customs, and practices, tourism can contribute to the vitality of communities and prevent the erosion of cultural identity (McIntosh et al., 2002).

3. Digital Engagement

The cluster surrounding cultural heritage is strongly linked to *digital engagement*, indicating an emerging trend where digital platforms play a pivotal role in promoting and preserving cultural

heritage (Onyenokulu et al., 2024). The nodes related to ‘social media’, ‘influencers’, and ‘reviews’ suggest that digital storytelling and user-generated content (UGC) are critical in shaping tourists' experiences and perceptions of cultural heritage sites. UGC, such as reviews, photos, and videos, offers authentic perspectives from other visitors, helping potential tourists make informed decisions and gain insights into the site's attractions (Sánchez-Franco et al., 2024). By incorporating UGC into the visitor experience, cultural heritage sites can involve visitors in the storytelling process, creating a more collaborative and participatory approach to tourism. The terms like ‘tourist’, and ‘engagement’ highlight how tourists are increasingly interacting with destinations and communities through digital means, enhancing both the tourism experience and the reach of responsible practices. For instance, one of the articles discussed responsible tourism, emphasizing the role of digital platforms in promoting eco-friendly travel options and educating tourists about sustainability. This aligns with the engagement node in the InfraNodus graph, where tourists use social media, travel blogs, and review platforms to share their experiences and influence others. These digital interactions not only enhance tourist satisfaction but also encourage responsible behaviour by providing a platform for feedback and awareness. Moreover, terms like ‘platform’, ‘offer’, ‘perk’, ‘discount’ and ‘contest’ relate to digital marketing and promotional strategies within tourism, particularly in the context of engaging tourists through online platforms to promote responsible tourism. These terms indicate efforts to incentivize and attract tourists by offering value-added services, deals, and interactive opportunities (Marin-Pantelescu et al., 2019). In the context of the Digital Engagement cluster, these terms reflect how tourism businesses and destinations leverage digital platforms to enhance tourist participation. Platforms serve as hubs where offers, discounts, and contests are promoted, encouraging tourists to engage with the brand

or destination more actively. For instance, special perks or discounts offered through digital channels motivate tourists to make travel decisions (Pinto et al., 2019), while contests enhance interaction and engagement, turning passive audiences into active participants (Lalicic et al., 2019). The analysed articles suggest that there is a need to properly engage tourists in promoting responsible tourism practices especially for cultural heritage sites.

4. Tourism Promotion

The Tourism Promotion cluster, as identified through the InfraNodus analysis, revolves around key terms such as 'initiative', 'government', 'development', 'marketing', 'focus', 'minister', 'sector', 'growth', and 'industry'. These terms suggest a strong focus on the role of government policies and industry initiatives in driving tourism development and growth, particularly through strategic marketing efforts and sector-specific programs. For instance, governments can establish clear guidelines and regulations to ensure that tourism activities adhere to environmental, social, and cultural standards. This includes setting limits on development, protecting natural resources, and promoting fair labour practices (Mihalic, 2016). Furthermore, government or local authorities can invest in sustainable infrastructure, such as renewable energy sources and eco-friendly transportation which can reduce the environmental impact of tourism (Baloch et al., 2023). The articles highlighted that government initiatives play a significant role in shaping responsible tourism promotion strategies. For instance, several initiatives are driven by government ministers and public policy frameworks aimed at promoting sustainable tourism development. These government-led programs often emphasize economic growth in the tourism sector while integrating elements of responsible tourism, such as environmental protection and cultural

preservation. Additionally, the emphasis on the marketing sector reflects how tourism promotion has become a critical aspect of national and local tourism strategies. The focus is not just on attracting tourists but also on developing responsible tourism as a key economic driver, particularly through collaborations between government bodies and the private sector. Several campaigns and initiatives are being designed to highlight both economic benefits and responsible tourism practices, promoting destinations in a way that supports local communities and aligns with broader sustainability goals. However, there is still a gap between these promotions and actual results which needs to be addressed by leveraging latest technology like AI. This finding is evident from Arora et al.'s (2024) study which highlighted the growing importance of AI in various sectors, including tourism. They argue that AI can play a significant role in promoting green destinations and achieving sustainable tourism goals.

5. Technological Innovation

Another key cluster that emerged from the network graph is related to *technological innovation* with a relatively low betweenness, emphasizing technology's growing role in tourism innovation. AI technologies, such as chatbots and recommendation systems, are reshaping the way tourists interact with services (Knani et al., 2022). Most of the articles did not extensively discuss the adoption of AI or the use of technology in promoting responsible tourism. While certain pieces briefly mention sustainability initiatives or digital tools, there is a noticeable lack of detailed exploration into how AI innovations or technological advancements are being leveraged to foster responsible tourism practices. The terms 'AI', 'technology', and 'innovation' in few articles reflected how digital advancements are enhancing both the operational efficiency and experiential

aspects of tourism. One of the articles emphasized the impact of artificial intelligence (AI) in managing large-scale operations within the tourism sector, such as optimizing booking systems, personalizing travel experiences, and providing real-time customer support through chatbots. These innovations enable the tourism industry to offer more tailored and efficient services, reducing operational costs while improving customer satisfaction (Ivanov et al., 2017). Another critical aspect of technological innovation discussed is the role of virtual tourism. With increasing global environmental concerns and travel restrictions, virtual tourism, powered by technologies like virtual reality (VR) and augmented reality (AR), allows tourists to engage with destinations without physically being present (Shamim et al., 2025). This aligns with the Digital Engagement cluster in the network graph, where terms like experience and engagement indicate the shift towards more immersive and interactive tourism experiences facilitated by digital platforms. The articles also highlight the sustainability angle of technology. AI-driven data analytics platforms help monitor environmental impacts and optimize resource use, making tourism more eco-friendly (Issa et al., 2024). This connects directly to the Responsible Tourism cluster, where sustainability is a core focus, underscoring how AI can support more responsible tourism practices by reducing carbon footprints and ensuring resource efficiency. Out of 262 articles only a handful of them discussed AI or technological advancement related to tourism. Therefore, these findings suggest a need to invest in technology to promote responsible tourism practices and enhance the engagement particularly for cultural heritage tourism. However, the potential for AI-driven "hallucinations" — wherein AI systems generate inaccurate or misleading information — poses a challenge to its integration into responsible tourism practices (Marcus et al., 2019). Thus, future research should

focus on ensuring that technological innovations align with responsible tourism values, safeguarding cultural accuracy and authenticity in the digital age.

Study 2

The second phase of the research was also qualitative in nature and primarily used a semi-structured interview. The inductive approach of semi-structured interview was used to gain an understanding of the socially constructed subjective reality (Hudson and Ozanne, 1988) of the participant representing potential tourists of heritage sites. Semi-structured interview frameworks exhibit considerable variability in their design, with some being more structured than others (Saunders, et al., 2019). For the current semi structured interviews, it was ascertained that questions were framed in a non-directive manner, primarily utilizing "What" and "How" questions (Saunders, et al., 2019). The complete interview guide can be found in Appendix B.

The interview questions were based around the key constructs identified in the literature review and content analysis related to cultural heritage sites and responsible tourism. The interview was then conducted with 25 participants that represent the target audience. The target comprised of individuals who have been to a cultural heritage site and are familiar with the notion of responsible tourism. The interview participants were selected from a wide range of socio-economic groups. A convenience sampling approach was adopted for the qualitative interviews, which is consistent with prior exploratory research in emerging and under-researched domains such as AI-driven responsible tourism (Saunders et al., 2019). The interview cohort (n=25) comprised a balanced gender distribution (e.g., 13 female, 12 male) with ages ranging from 22 to 45 years. Participants represented diverse professional backgrounds, including education, tourism management, and

technology sectors, with 72% holding a postgraduate degree. Recruitment was conducted over a six-week period via professional networks, academic contacts, and social media platforms (e.g., LinkedIn and Facebook groups), enabling access to individuals with prior experience of cultural heritage tourism. This ensured that participants could provide the depth of insight required for exploratory inquiry (Patton, 2014). Out of the 40 individuals who initially expressed interest, 25 completed the interview, representing a 62.5% participation rate among eligible leads. While convenience sampling limits statistical generalizability, it is appropriate for qualitative inquiry where the objective is depth of insight rather than population-level inference. To ensure the adequacy of the sample size, thematic saturation was used as the guiding criterion. Saturation was defined as the point at which no new codes or sub-themes emerged from three consecutive interviews (Francis et al., 2010). While preliminary patterns were identified by interview 18, data collection was extended to 25 participants to ensure thematic density across different socio-demographic profiles.The interview sample included participants of varying age groups, genders, educational backgrounds, and occupational profiles, all of whom had prior exposure to cultural heritage tourism and awareness of responsible tourism practices.

Before the interviews, a pre-screening survey was conducted to identify key participants. This pre-screening included questions to determine whether participants were familiar with the concept of responsible tourism and if they had ever visited a cultural heritage site. A predefined guide was used for each interview, covering topics such as Cultural Heritage Experience, cultural identity, engagement with Cultural Heritage Tourism, and the potential for AI hallucination (misleading information). The interviews were conducted online via Zoom. All interviews were recorded with

participant consent and transcribed verbatim for thematic analysis. Ethical rigor was maintained throughout the research process. Participation in both the qualitative and quantitative phases was entirely voluntary, and participants were informed that they could withdraw at any time without penalty. To ensure anonymity, all interview transcripts were de-identified, and survey data were collected through a platform that did not record IP addresses or personal identifiers. All data were stored on password-protected institutional servers and were only accessible to the research team.

Data were analyzed following Braun and Clarke's (2006) six-phase framework for thematic analysis. The coding protocol involved a hybrid approach: deductive coding, based on the predetermined constructs of Emotional Appraisal and Cultural Identity, and inductive coding, allowing for emergent themes to surface. Initial codes were generated at the semantic level before being clustered into latent themes that captured underlying conceptual patterns. To ensure the integrity and confirmability of the findings, a rigorous multi-stage thematic analysis was employed (Braun et al., 2006). The trustworthiness was maintained through an exhaustive iterative coding process (Creswell et al., 2018). This involved three distinct rounds of recoding to ensure consistency and the maintenance of a detailed audit trail, documenting every stage of theme development from initial codes to final conceptual categories. To minimize researcher bias, negative case analysis was performed, where the researcher actively sought out interview data that contradicted the emerging themes, ensuring the final results reflected the full breadth of participant perspectives.

Results for Study 2

Based on 25 interviews, 5 key themes emerged from the interview analysis as *Engagement and Experience with Cultural Heritage Tourism, Responsible Tourism, AI Hallucination Potential,*

Perceived Cultural Accuracy and Cultural Identity. These themes are explained below with a list of interviewees' responses presented in Table 2. The first set of questions asked about participants' experiences and visitation to the cultural heritage sites. The respondents discussed their experiences and engagement with cultural heritage sites through emotional and cultural connections. Engagement and experience play a critical role in shaping how visitors connect with cultural heritage sites. According to prior research, engagement in cultural heritage is often tied to emotional experiences, as these sites serve as tangible connections to history and cultural legacy (Rasoolimanesh et al., 2019). One of the respondents felt a strong emotional connection to a cultural site in their city, expressing dismay at how poorly it has been treated by tourists. They emphasized the importance of preserving the heritage and avoiding actions that damage it. This aligns with the growing body of literature surrounding cultural heritage tourism concerning preservation as well as responsible tourism (Buitrago-Esquinas et al., 2023). The interviewees reflected on their personal connection to heritage sites, emphasizing that their engagement was driven by a desire to learn about the history and significance of the sites they visited. Furthermore, upon asking about how they make decisions on which cultural heritage site to visit, the interviewees responded that the choice of cultural sites was influenced by both online reviews and word of mouth. Some participants emphasized that while reviews on platforms like Google or social media provide useful insights, they prioritize personal recommendations from friends or family, finding them more trustworthy. This finding aligns with existing literature suggesting that user-generated content, including reviews and personal recommendations, significantly influences tourists' decisions (Sánchez-Franco et al., 2024). Moreover, others noted that digital images and social media posts influence their anticipation and expectations before visiting a site, as visual content offers a first glimpse that can shape their curiosity or preferences for certain destinations.

This interaction with both digital platforms and personal networks highlights the dual role of technology and personal connections in cultural tourism engagement.

Next set of questions revolved around Responsible Tourism. We first asked them what responsible tourism means to them and the responses gathered from the interviewees are expressed as a word cloud in Figure 6. In the context of Responsible Tourism, the interviewees stressed the importance of preserving cultural heritage sites for future generations. This perspective is consistent with the growing body of research on sustainable and responsible tourism, which emphasizes minimizing negative environmental impacts while promoting cultural preservation (Onyenokulu et al., 2024). The interviewees noted that tourists should engage in behaviours that reduce their ecological footprint, such as avoiding littering and using non-polluting transportation options. This aligns with the concept of environmentally responsible tourism, which advocates for tourists to respect both the physical environment and the cultural context of heritage sites (Gong et al., 2019; Nguyen et al., 2024). Moreover, one of the interviewees mentioned about global warming and how negligence in taking care of the heritage site could lead to a possible loss of history. Additionally, several interviewees mentioned that reading reviews about others' responsible practices, such as respecting local customs or avoiding littering, influenced their own behaviour at heritage sites (Nguyen et al., 2024). The participants further mentioned the importance of sustainability in preserving heritage sites against the pressures of modernization and environmental degradation, echoing the need for long-term conservation strategies as identified in the literature.

Next set of questions revolved around AI's use for cultural heritage sites and responsible tourism. The emerging theme from the interviews was AI Hallucination Potential, reflecting concerns over the accuracy of AI-generated representations of cultural heritage sites. The term 'AI hallucination' refers to situations where AI systems generate content that deviates from reality or provides false

information (Christensen et al., 2024). The interviewees noted that while AI can produce visually appealing images of heritage sites, these representations are often sanitized or idealized, failing to capture the true condition of the sites. One of the respondents highlighted the discrepancy between AI-generated cleanliness of the site and the reality. In her view, AI presents a flawless version of cultural sites, which contrasts with the often poorly maintained reality of many heritage locations . Similarly, another interviewee noted that AI representations tend to overstate advancements such as ramps for accessibility, which do not always exist in real-world sites. Moreover, the interviewees emphasized that AI lacks emotional depth and cultural context, especially concerning the unique, emotion-driven aspects. This concern is supported by research indicating that AI systems, while powerful in generating content, often lack the contextual understanding needed to depict cultural and historical nuances accurately (Bender et al., 2021). The disconnect between AI-generated content and the real-world experience of heritage sites suggests that reliance on AI imagery may lead to misleading perceptions, which can negatively impact tourist expectations and the authenticity of cultural experiences (Christensen et al., 2023).

The theme of Perceived Cultural Accuracy builds on the concerns regarding AI representations by exploring the gap between authenticity and representation. We showed the interviewees an GAI generated image of a generic cultural heritage site from their country and asked if they can identify the site and relate to it. One of the interviewees mentioned that she can see a similarity in the cultural heritage site to the one she has seen before by looking at the structure, temples, colour and overall aesthetics. Majority of the interviewees expressed the view that while AI-generated images might capture the aesthetic aspects of heritage sites, they often fail to represent the lived realities and cultural contexts of these locations. This critique is consistent with the literature on tourism authenticity, which suggests that cultural tourists seek authentic experiences that connect them

with the historical and social fabric of the destination (Park et al., 2019). Furthermore, the interviewees mentioned that AI sometimes fails to create authentic and genuine images because it cannot capture the cultural perspective yet which in turn loses tourists interest and engagement towards visiting a cultural heritage site. These findings are evident from the literature, which claims that visitors are more likely to have an emotional connection to any cultural heritage places that have genuine historical environments (Waitt, 2000; Park et al., 2019). This challenge with AI-generated content lies in its tendency to prioritize visual accuracy over deeper cultural authenticity, potentially leading tourists to form unrealistic expectations about the state of cultural heritage sites. This aligns with research indicating that the commodification of heritage through digital platforms can sometimes distort cultural representations (Liu, 2024).

Lastly, Cultural Identity emerged as another key theme in shaping an individual's emotional response towards cultural heritage tourism. The interviews revealed the strong influence of Cultural Identity in shaping tourists' experiences with heritage sites. Cultural Identity plays a crucial role in how individuals relate to heritage, as these sites often serve as symbols of national or religious identity (Yang et al., 2022). One of the interviewees mentioned that the artistry and historical significance of these sites evoke a deep emotional response, reinforcing a sense of connection with ancestral heritage. The interviewees also expressed a sense of pride and belonging when visiting cultural sites, which reflects the role of heritage in reinforcing personal and collective identity (He et al., 2015). This sense of connection also influences their travel choices, as participants preferred visiting sites that resonate with their cultural and religious backgrounds. The findings align with the literature on heritage tourism as a means of exploring and affirming cultural identity (Timothy, 2011). Moreover, the interviewees revealed that cultural heritage sites serve as physical manifestations of a shared history and identity, and visiting these places fosters

a deepened connection to their culture. AI-generated representations, by missing this emotional depth, may struggle to evoke the same level of engagement and pride among viewers. The themes derived from content analysis and interviews resulted in the development of a conceptual framework and hypotheses to be tested.

Table 2: Result of the interviews

Themes	Hypotheses	Description	Supporting Literature	Example of participant response
Engagement and Experience with Cultural Heritage Tourism	**H3**: Emotional Responses derived from the nudges will significantly influence Engagement towards Cultural Heritage Tourism (CHT)	Online Reviews	Sánchez-Franco et al., 2024	*I, of course, check the reviews before going and the facilities there.*
		Word-of-Mouth	Mathew et al., 2024	*If people I know have already visited, it's very easier to go.*
				I think a friend who has been there, they give some tip ... if we know somebody living in that place then they have the real takeaway, because they know what is touristy and what is truly a part of their culture.
		Social media engagement	Rasoolimanesh et al., 2019	*On Instagram, of course, I share on social media and with my people...that was a great experience for me*
				If I have liked something, I can click the picture, and I can post in social media so that other people can also know about it through post
		Recommendations	Sánchez-Franco et al., 2024	*I would recommend it to people and speak about it... if it has cultural relevance.*
Responsible Tourism	**H4:** The Engagement in Cultural	Responsible Behaviour	Chui et al., 2011	*We should not pollute...we can walk more rather than taking vehicles, and not throw junk there.*

	Heritage Tourism (CHT) will significantly enhance responsible tourism			*They (tourists) should respect their environment, not litter around or damage the property... it's about being respectful.*
				I will not adopt any things which are unsustainable, like carrying plastic water bottles and dropping that in place of cultural heritage.
		Preference for sustainability	Grilli et al., 2021	*If we can have sustainable things in the cultural area side, obviously this is preferred.*
				I favor locations that emphasize eco-friendly practices and support local communities. Visiting sites committed to conservation enhances my experience and aligns with my values as a responsible traveler.
Cultural Identity	**H5:** Cultural Identity will moderate the relationship between nudges delivered through Generative AI and Emotional Responses	Cognitive Cultural Identity	Yang et al., 2022	*While visiting, say, the Tower Bridge in London, and going to the Museum, and having to see elements of the Kohenur and elements of things taken from Indian culture, or even going to some of the African nations and seeing the Indian links because the British had taken Indians over there gives you a sense of connectedness to the entire experience.*
		Affective Cultural Identity		*It just makes you feel proud of the culture... gives you a feeling of belongingness.*
	H6: AI hallucination	Misleading information	Christensen et al., 2024	*AI has generated very realistic pictures... but sometimes, the image is misleading*

AI Hallucination Potential	will moderate the relationship between nudges delivered through Generative AI and Emotional Responses **H7:** AI hallucination will moderate the relationship between emotional response and Engagement towards Cultural Heritage Tourism (CHT)			*Most of the time it's misleading... AI gives a generated photo out of whatever little information it has been fed.*
		Imaginary scenarios		*I'm looking for a hotel to guide them where to stay, and ... there is a lot of misleading information.. they'll make it seem that some location is very close to a cultural centre.*
				The AI image showed a special access ramp that doesn't actually exist at the site. It creates false expectations for visitors who might need that accessibility.
Perceived Cultural Accurascy	**H8:** Perceived cultural accuracy will moderate the relationship	Object based Authenticity	Park et al., 2019	*The marble work, the detailing, the symmetry—it's the physical aspects of the Taj Mahal that made me feel like I was stepping back in time. You can't fake that kind of craftsmanship.*

	between nudges delivered through Generative AI and Emotional Responses **H9:** Perceived cultural accuracy will moderate the relationship between emotional response and Engagement towards Cultural			*The structure of CSTM Railway Station, built by the British, shows a piece of history preserved in its architecture. It felt authentic because you can see and touch the history*

	Heritage Tourism (CHT)	Existential Authenticity		*I noticed some inaccuracies, like the architecture, in the background doesn't match what I remember, and the representation of certain rituals seems exaggerated.*

Figure 6: *Word cloud for 'Responsible Tourism'*

Study 3

The findings from the discourse analysis and interviews highlight the relevance of AI to promote and experience cultural heritages sites. Drawing on those findings, study 3 used an experimental design to understand participant response towards different types of AI-driven nudges created to enhance responsible tourism in cultural heritage sites. The experiment was conducted online. Six treatment conditions (3*2 factorial design) were prepared each based on nudges valence (positive, neutral and negative), and context (Indian or UK heritage sites) (Table 3)

		Heritage Site Origin (Cultural Identity)	
		Site 1	**Site 2**
Type of Nudge	Positive Frame (Social Influence)	50	50

based emotional appeal	Neutral Frame (Factual)	50	50
	Negative Framing (Fear Nudge)	50	50

Table 3: *Showing 3*2 between sample post treatment factorial design. Factor 1 (nudge types) three levels; Factor 2 (Cultural Identity Manipulation) two levels*

A total of 300 respondents participated in the study. The adequacy of the survey sample size was evaluated using G*Power (Faul et al., 2009). Following guidelines by Hair et al. (2019), the sample size requirement was determined based on the most complex endogenous construct, Engagement, which is influenced by eight predictors (including direct paths and interaction terms for moderation). For a model with eight predictors, a power analysis indicates that a sample size of 109 is required to achieve a statistical power of 0.80 at a 5% significance level for detecting a medium effect size (f^2=0.15). Our final sample of 300 respondents significantly exceeds this threshold. Furthermore, a post-hoc power analysis confirms that with N=300 and eight predictors, the study achieves a power greater than 0.95 for medium effects and is sufficiently powered to detect smaller effect sizes (f2≈0.05), which are typical in social science moderation studies (Aguinis et al., 2005). Survey respondents were recruited using a convenience sampling approach through online platforms, including social media networks, and LinkedIn. Participation was voluntary, and respondents were screened to ensure prior exposure to cultural heritage tourism. Since, all the questions were mandatory to answer, therefore, the response rate was 100%. While convenience sampling may limit representativeness, it is widely used in experimental and behavioural tourism research where the objective is theory testing rather than population estimation (Fong et al., 2016). The sample was predominantly composed of females (69.2%) as compared to male (30.5%) with majority (81%) of the respondents falling in the age range of 30-40 years. There was a geographical split of (e.g., 50% UK-based and 50% India-based) to facilitate

the cross-cultural comparison. Detailed demographic profiles - including income brackets and education - were captured to ensure the sample reflected a broad consumer base familiar with digital tourism tools. Each participant was then randomly (randomized control trials) exposed to one of the six treatment conditions (between group sampling). This was done by letting the participants pick one number between 1 to 6. A target of 50 per treatment group was ascertained to achieve normality within each group and comparability between groups. The data from all respondents were complete.

As manipulation for emotional response, three variants of nudge-based stimulus i.e. Social Influence Condition or positively framed nudge (Positive Condition), Fear nudge or loss framing (Negative condition) and a third Control Frame (Neutral Condition) was presented, with two groups being presented to each type. Three out of the six groups were exposed to stimulus from Indian heritage sites and the remaining three groups from UK heritage sites, as manipulation for cultural identity. While a formal Multi-Group Analysis (MGA) was not the primary focus, cross-cultural variance was rigorously accounted for through the inclusion of Cultural Identity as a moderating variable in the structural model (H5). Consistent with Hair et al. (2019), a continuous moderation approach was preferred over MGA to avoid the 'dichotomization' of cultural constructs, which can lead to biased estimates and reduced sensitivity in detecting interaction effects. This approach ensures that the model captures the subtle nuances of cultural identity as a psychological state. By testing the interaction effects between the AI-driven nudges and the participants' cultural identity, the study statistically evaluated how cultural orientation conditions emotional responses. This approach allows for a nuanced understanding of cultural influence as a

continuous construct rather than a binary categorical split, which is consistent with established practices in behavioral SEM research (Hair et al., 2019).

The stimulus was created using Adobe Firefly, a prompt-to-image generative AI tool, to design culturally relevant visuals. Additionally, ChatGPT (version GPT-5) was used to generate text-based nudges, ensuring alignment with the experimental conditions (positive, neutral, and negative). To ensure ethical and responsible use of Generative AI, all AI-generated content underwent human-in-the-loop verification by the authors to assess and ensure cultural sensitivity, historical plausibility, and contextual accuracy before presenting it to the participants. Prompts were carefully designed to minimise algorithmic bias and avoid exaggerated or misleading cultural representations. No personal or user-specific data were used in the generation process, ensuring compliance with data privacy standards. To enhance transparency and replicability, sample and follow-up prompts used for AI image generation, along with representative stimuli, are provided in Appendix C (1-6) and D. After the treatment was given, data was collected pertaining to the various constructs of interest measured through established scale. Emotional Response (Marcus et al., 2019), Engagement towards Cultural Heritage Tourism (Majeed et al., 2020), Responsible Tourism (Chui et al., 2011), Cultural identity (Yang et al., 2022), Perceived Cultural Accuracy (Park et al., 2019) and AI Hallucination Potential (Christensen et al., 2024) were the key constructs that were measured. The scale table can be found in Appendix E. Consistent with prior experimental research in tourism and sustainability, this study focuses on behavioral intentions rather than directly observed behaviors. Intentions represent the most proximal antecedents of behavior and are particularly suitable for controlled online experimental

designs where real-world actions cannot be directly observed (Ajzen, 1991; Chui et al., 2011). This approach allows for standardized exposure to AI-generated nudges while preserving internal validity. Nevertheless, a recognized 'intention-behavior gap' often exists wherein stated intentions do not fully translate into actual conduct at physical heritage sites. To mitigate this limitation, future research should transition from lab-based simulations toward longitudinal field studies designed to measure real-world compliance. For instance, the deployment of geofencing technology or mobile application tracking could objectively monitor visitor movement and adherence to GAI-driven suggestions in situ. Such empirical evidence would provide a robust validation of the Emotional Response construct by linking digital psychological triggers to sensor-verified behavioral outcomes.

Prior to data collection, the data collection instrument was shown to five experts, to gain insight on the accessibility, sequencing and rationale of the instrument. Based on the feedback certain adjustments with respect to the language and sequence of questions were made. Subsequently a pilot study was conducted to verify the validity and reliability of the scale being used. Once the final scale was arrived at, the respective treatment group were asked to respond to the various survey questions (Appendix E).

Given that data were collected using a single survey instrument, common method bias was assessed using Harman's single-factor test. The unrotated factor solution revealed that the first factor accounted for less than 50% of the total variance, indicating that common method bias is unlikely to be a serious concern in this study. In addition, procedural remedies such as assuring respondent anonymity and reducing item ambiguity were implemented to further mitigate potential

bias. The data was analysed using Path Analysis (Structural Equation Modelling) using SMART-PLS. The sample size of 300 respondents exceeds the minimum requirements for PLS-SEM analysis. According to Hair et al. (2019) the sample size was more than adequate given the maximum number of structural paths directed at any construct in the model. In addition, prior simulation studies suggest that sample sizes above 200 provide sufficient statistical power to detect medium effect sizes in PLS-SEM models with multiple moderators (Hair et al., 2019; Ringle et al., 2024). Therefore, the sample size employed in this study is considered appropriate for robust hypothesis testing. Hypotheses were tested by estimating the corresponding structural paths specified in the conceptual framework (Figure 2) using PLS-SEM with bootstrapping (5,000 subsamples). Each hypothesis was evaluated based on the statistical significance, direction, and effect size (f^2) of its associated path coefficient. Table 6 reports the results for each hypothesized relationship, and findings are discussed sequentially by hypothesis below.

Results of Study 3

Model Assessment

The measurement model was evaluated for validity, reliability along with factor loadings to determine the quality of the constructs in the study which is essential before testing the hypotheses (Hair et al., 2019). Table 4 presents Cronbach's alpha and composite reliability, two widely used techniques for evaluating reliability. The selected survey items for each construct are reliable and valid measures, as both indicators are above the necessary threshold of 0.7 (Hair et al., 2019). Additionally, every factor loading value found in the measurement model was higher than the benchmark of 0.7 (Hair et al., 2019). However, during measurement model assessment, three items

from emotional response (Enthusiastic, Hopeful and Proud) were removed due to low outer loadings and cross-loadings that did not meet recommended thresholds. Item removal followed established PLS-SEM guidelines, retaining only items with satisfactory reliability and convergent validity (Hair et al., 2019). The final scale demonstrated acceptable internal consistency and construct validity which is presented in table 4. The AVE (Average Variance Extracted) should be higher than 0.5 (Hair et al., 2019) and in the model assessment, it ranged from 0.646 to 0.817, indicating convergent validity of the measurement model (Lekwa et al., 2019).

Constructs	Items	Factor Loadings	VIF	Cronbach Alpha	Composite Reliability	AVE
ER	ER1	0.86	3.189	0.916	0.933	0.666
	ER2	0.802	2.544			
	ER3	0.833	2.936			
	ER4	0.864	2.931			
	ER5	0.761	1.894			
	ER6	0.839	2.98			
	ER7	0.747	1.947			
ENG	ENG1	0.822	2.298	0.904	0.929	0.723
	ENG2	0.888	3.28			
	ENG 3	0.871	2.85			
	ENG4	0.842	2.459			
	ENG5	0.826	2.257			
RT	RT1	0.874	2.146	0.865	0.917	0.787
	RT2	0.903	2.42			
	RT3	0.884	2.18			
CI	CI1	0.814	2.3	0.91	0.927	0.646
	CI2	0.859	3.124			

	CI3	0.84	2.912			
	CI4	0.813	2.369			
	CI5	0.837	2.25			
	CI6	0.733	2.106			
	CI7	0.721	1.957			
PCA	PCA1	0.895	2.382	0.888	0.931	0.817
	PCA2	0.897	3.01			
	PCA3	0.909	2.539			
AHP	AHP1	0.825	2.221	0.896	0.924	0.707
	AHP2	0.876	2.924			
	AHP3	0.824	2.318			
	AHP4	0.848	2.469			
	AHP5	0.831	2.319			

Abbreviations: ER – Emotional Response; ENG – Engagement in cultural heritage tourism; RT – Responsible Tourism; CI – Cultural Identity; PCA – Perceived Cultural Accuracy; AHP – AI Hallucination Potential; VIF – Variance Inflation Factor; AVE – Average Variance Extracted

Table 4. *Convergent validity, Discriminant validity and Construct Reliability*

Furthermore, discriminant validity was assessed using the Fornell-Larcker criteria (1981) which compares the square root values of the AVE with the correlation coefficients between the latent variables (as displayed in Table 4). When all AVE square root values are greater than the correlation coefficients, discriminant validity is verified (Rasoolimanesh, 2022). The degree of multicollinearity among indicators is measured by the Variance Inflation Factor (VIF) in regression analysis (Fornell et al., 1981). Multicollinearity was assessed using variance inflation factors (VIF). All VIF values ranged between 1.21 and 3.28 in Table 4, remaining below the conservative threshold of 5 (Hair et al., 2019), indicating that multicollinearity does not pose a concern for the estimation of the structural model. To address potential endogeneity in the

relationship between GAI-driven nudges and emotional responses, the study employed a two-pronged approach. First, the experimental manipulation of the nudge framing (random assignment to neutral, positive or negative frames) minimizes endogeneity concerns, as the treatment was exogenous to the participants' pre-existing emotional states. Second, following Hult et al. (2018), the aforementioned VIF assessment (maximum 3.28) indicates that the model is unlikely to suffer from endogeneity-related bias. While a formal Instrumental Variable (IV) analysis was not conducted, the inclusion of control variables such as age, gender, and prior experience with AI helps mitigate potential omitted variable bias. Moreover, a good model fit was determined by SRMR's criterion which suggests a cut-off value of less than 0.08 (Ringle et al., 2024), in this study's case it was 0.074. Furthermore, HTMT values are less than 1 for all constructs (Hair et al., 2019).

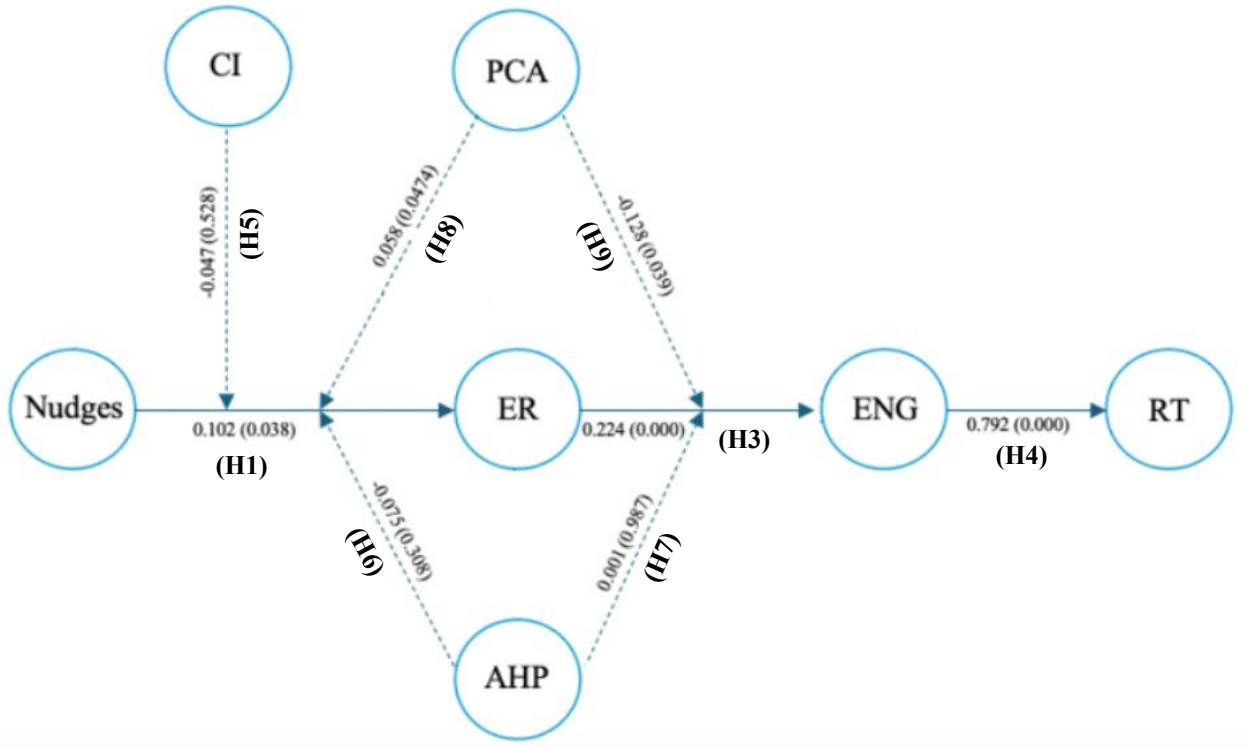
	AHP	CI	ER	ENG	NUDGES	PCA	RT
AHP	**0.841**						
CI	0.616	**0.804**					
ER	0.478	0.345	**0.816**				
ENG	0.638	0.698	0.516	**0.85**			
NUDGES	0.182	0.167	0.221	0.248	**1**		
PCA	0.674	0.66	0.467	0.695	0.259	**0.904**	
RT	0.621	0.673	0.536	0.792	0.193	0.657	**0.887**

Note: Bold values represent the square-root of AVE

Abbreviations: AHP – AI Hallucination Potential; CI – Cultural Identity; ER – Emotional Response; ENG – Engagement in cultural heritage tourism; NUDGES – Nudges delivered via Generative AI; PCA – Perceived Cultural Accuracy; RT – Responsible Tourism

Table 5. *Inter-correlation between the constructs and the square root of AVEs (Fornell–Larcker criterion)*

After the above steps, *Structural Equation Modelling* was applied (Figure 7) to determine the impact of AI-driven nudges on emotional responses which leads to Engagement and Responsible Tourism along with the moderators such as cultural identity, perceived cultural accuracy and AI hallucination potential. In line with hypotheses H5–H9, cultural identity, perceived cultural accuracy and AI hallucination potential were theorized and tested as moderating variables that condition the strength of the relationships between AI-driven nudges, emotional responses, and downstream outcomes, rather than as independent causal antecedents. Moderation hypotheses (H5–H9) were tested by specifying interaction effects within the PLS-SEM model, in line with established methodological guidelines (Hair et al., 2019; Rasoolimanesh et al., 2022). Interaction terms were created by multiplying the standardized predictor and moderator constructs using the product-indicator approach implemented in SmartPLS. These interaction terms were included as separate paths from direct effects in the structural model to estimate conditional effects, allowing assessment of whether the strength of the focal relationships varied across levels of cultural identity, perceived cultural accuracy, and AI hallucination potential. This modelling approach is consistent with prior SEM-based research in tourism and behavioural studies, where moderating effects are estimated through interaction terms within the structural model, while simplified visual representations are used to maintain clarity and interpretability of complex relationships. Following 9 hypotheses were tested with a sample size of 300 respondents using bootstrapping method in SMART PLS. To ensure robustness, bootstrapping was conducted using 5,000 subsamples, enabling stable estimation of path coefficients, standard errors, and confidence intervals. All significant paths remained consistent across resamples, supporting the stability and reliability of the structural relationships.



Note: The dotted line shows the moderation, and the straight lines indicate direct relation.
Abbreviations: Nudges – Nudges delivered via Generative AI; ER – Emotional Response; ENG – Engagement in cultural heritage tourism; RT – Responsible Tourism; CI – Cultural Identity; PCA – Perceived Cultural Accuracy; AHP – AI Hallucination Potential; H1-H9 – Hypotheses 1 to 9

Figure 7: *Structural Modelling of the proposed hypotheses with Path coefficients and p-values*

F-value (sig.)= 3.44* (0.033)			
	Neutral Frame	Negative Frame	Positive Frame
Mean (sd) Emotional Response (scale adjusted: 1= min, 7 max)	3.14(1.84)	3.23(1.57)	2.63 (1.61)
Mean difference with neutral frame (sig)	-	-0.09 (0.979)	0.51 (0.103)
Mean difference with negative frame (sig)	0.09 (0.979)	-	0.6* (0.032)

Note:The mean difference is significant at the 0.05 level.

Table 5a : *f-test table to compare the Emotional Response caused by the different nudge frames*

Hypotheses Testing

The path coefficients, standard deviations, and p-values are presented in Table 6. H1 predicted that nudges delivered through Generative AI would significantly influence emotional responses. This hypothesis was tested via the direct structural path from Nudges to Emotional Response. The results indicate a significant positive effect ($\beta = 0.108$, $p = 0.038$, $f^2 = 0.014$), providing support for H1. Acceptance of H1 demonstrates that the nuanced linguistic framing provided by Generative AI can substantially shift an individual's affective baseline. It is important to note that different analytical approaches are used to test the hypotheses based on their conceptual nature. H1 and H3–H9 examine relationships between latent constructs and are therefore tested using PLS-SEM. In contrast, H2 is formulated as a between-group comparison hypothesis, focusing on differences in emotional responses across three experimental conditions (positive, neutral, and negative nudges). This approach is appropriate as H2 concerns mean differences in emotional valence across experimental groups, rather than causal relationships between constructs. Therefore, ANOVA enables comparison of whether negative nudges generate significantly more negatively valenced emotional responses relative to other conditions. The ANOVA results (see Table 5a) support H2, indicating differential impact of framing on emotional valence ($F= 3.44$; $p=0.033$). Post-hoc comparisons indicate that negative nudges elicit significantly more negatively valenced emotional responses compared to positive nudges (mean difference = 0.6, $p = 0.032$), while differences between negative and neutral nudges are not statistically significant. This suggests a partial differentiation effect across nudge conditions, rather than a uniform superiority of negative framing. Importantly, this finding reflects differences in emotional valence rather than behavioural effectiveness. The implications of these emotional differences for engagement and

responsible tourism behaviour are examined through subsequent hypotheses (H3 and H4). When participants were shown two images for the negative nudge, the first image depicted how the cultural heritage site used to look in the past, showcasing its pristine state, rich cultural significance, and beauty. The second image contrasted this by showing the site in its current state of neglect, where it was ruined, wrecked, and littered with garbage, communicating the consequences of irresponsible tourism and lack of preservation. This stark visual comparison was intended to evoke negative emotions such as afraid, bitter or even sadness, encouraging participants to adopt more responsible behaviours to prevent further degradation of the heritage site. Overall, the results indicate that negative nudges are more likely to elicit stronger negatively valenced emotional responses relative to positive nudges, although this effect is not consistently observed across all comparisons. The results for each nudge type's emotional impact are presented in Table 7. Results here re-instate the finding from PLS-SEM that different type of nudge frames have different impact on emotional response, and further it demonstrates that the diffential impact is true for each of the seven types of emotions included in the scale. Table 7a further verifies that respondents differ in terms of emotional response to local heritage site (Indian sites) vs International Heritage sites (UK site). While the difference on emotional impact for positive and neutral nudges for the above two sites are significant, no clear distinction is seen for negative nudges (except resentfulness and scare) indicating the negative nudges are almost universally effective to emanate emotional response.

Moreover, H3 predicted that emotional responses would positively influence engagement in cultural heritage tourism. The structural path from Emotional Response to Engagement was

significant ($\beta = 0.224$, $p < 0.001$, $f^2 = 0.084$), supporting H3. This suggests that AI-driven nudges can significantly influence an individual's emotional response which can lead to engagement in cultural heritage tourism. These results suggest that emotional responses partially mediate the relationship between nudges and engagement. Although the effect size for H1 is small, it indicates that nudges exert a meaningful influence on emotional responses, while H3 demonstrates a small-to-moderate effect on engagement. Furthermore, the engagement significantly drives responsible tourism behaviours, with a strong positive relationship found between engagement in CHT and responsible tourism (*hypothesis 4*) ($\beta = 0.792$, $p < 0.001$ and $F^2 = 1.683$). This large effect confirms the notion that emotionally engaged tourists are more likely to adopt responsible behaviour, such as donations or promoting cultural heritage through social media or WOM.

Moreover, the moderating effects of cultural identity (*hypothesis 5)* and perceived cultural accuracy (*hypothesis 8)* on emotional responses were found to be non-significant ($p > 0.05$ and $F^2 \leq 0.005$), as shown in Table 6. However, upon a deeper analysis showed that cultural identity and perceived cultural accuracy act as mediators rather than moderators. This means that they influence the strength or direction of the relationship, rather than simply determining whether the relationship exists. This finding aligns with Kitayama et al.'s (2006) study which shows how cultural identity shapes the types of emotions that are experienced in response to social stimuli, such as nudges. It explains how cultural values influence whether a nudge leads to socially engaging (positive) or disengaging (negative) emotional responses. Additionally, *hypotheses 6 and 7* were rejected ($p > 0.05$ and $F^2 \leq 0.002$), showing no significant moderation effect of AI Hallucination Potential in the paths between nudges, emotional response or engagement in CHT.

The non-significant moderating effect of AI hallucination potential may suggest that, within the controlled experimental context of this study, participants primarily responded to the emotional and visual salience of the AI-driven nudges rather than critically evaluating their factual accuracy. This finding may indicate a heuristic processing mechanism, whereby emotionally evocative content overrides concerns related to AI credibility or hallucination risk (Sundar, 2008). Alternatively, participants' limited familiarity with AI-generated heritage imagery may have constrained their ability to assess hallucination potential meaningfully at the point of exposure (Nightingale et al., 2017). To further explore this non-significance, a post-hoc sensitivity analysis was conducted. The results suggest that the affective primacy of the GAI-driven imagery likely overshadowed cognitive scrutiny. Specifically, for participants reporting high levels of emotional resonance (H1-H4), the coefficient for AI Hallucination Potential remained negligible. This implies that in heritage contexts, the 'aesthetic' and 'emotional' truth of a nudge may carry more weight than its 'factual' or 'technical' truth, particularly when the nudge is framed with high emotional valence. These findings allow for a preliminary conceptual proposition regarding GAI trustworthiness in behavioral interventions. In contrast to traditional information-seeking tasks where accuracy is paramount, GAI-driven behavioral nudges operate under a Transportation Theory (Green, 2008). In this model, the trustworthiness of a GAI agent is not evaluated through technical accuracy (hallucination-free) but through cultural and emotional alignment. If a nudge feels culturally authentic and resonates emotionally, the user's cognitive threshold for detecting AI-generated inaccuracies is raised. This suggests that for GAI-driven behavioral change, perceived cultural credibility (as supported in H9) is a more potent moderator of engagement than objective technical reliability. Moreover, *hypothesis 9* was accepted with a small

effect (β = -0.128, p = 0.039 and F^2 = 0.027) which states that perceived cultural accuracy moderates the relationship between emotional responses and engagement. Overall, effect sizes ranged from small to very large. Small effect sizes were observed for interactions and moderation effects, which is usual in behavioral research; for example, Aguinis et al. (2005) reported a median f^2 of 0.002 for moderating effects in a 30-year review of multiple regression studies. Engagement, however, exhibited a large effect on responsible tourism outcomes, highlighting its strong practical influence. These findings suggest that even small incremental effects of nudges and cultural factors can meaningfully shape engagement and responsible behaviors in cultural heritage tourism. Although the experimental manipulation of nudge framing supports causal inference for the direct effects of AI-driven nudges on emotional responses and engagement (H1–H4), moderation analyses involving cultural identity, perceived cultural accuracy, and AI hallucination potential rely on measured individual differences rather than experimental manipulation. Accordingly, these moderation effects are be interpreted as conditional associations rather than causal mechanisms, consistent with best practice in SEM-based behavioural research (Hair et al., 2019).

Hypotheses	Path	Beta coefficients	Standard deviation	P values	Supported
H1	NUDG → ER	0.108	0.049	0.038	Yes
H3	ER → ENG	0.224	0.054	0.000	Yes
H4	ENG → RT	0.792	0.024	0.000	Yes
H5	CI x NUDG → ER	-0.047	0.074	0.528	No
H6	AHP x NUDG → ER	-0.075	0.074	0.308	No
H7	AHP x ER → ENG	0.001	0.059	0.987	No
H8	PCA x NUDG → ER	0.058	0.081	0.474	No
H9	PCA x ER → ENG	-0.128	0.062	0.039	Yes

Table 6: Path coefficients, p values (<0.05) and hypotheses testing summary.

Abbreviations: ER – Emotional Response; ENG – Engagement in cultural heritage tourism; RT – Responsible Tourism; CI – Cultural Identity; PCA – Perceived Cultural Accuracy; AHP – AI Hallucination Potential

Mean scores								
Cultural Site	**Nudge**	**Afraid**	**Angry**	**Hateful**	**Bitter**	**Resentful**	**Scared**	**Worried**
Site 1	Neutral	3.5	2.94	3.2	3.0	3.4	3.26	2.9
	Positive	3.66	4.14	3.86	4.04	3.88	3.84	3.68
	Negative	4.14	4.04	**4.42**	**4.2**	4.06	4.16	3.44
Site 2	Neutral	4.74	4.84	4.52	4.8	4.8	4.16	4.10
	Positive	3.98	4.04	4.52	4.2	3.84	3.94	4.08
	Negative	**5.06**	4.66	4.04	**5.2**	4.58	4.22	4.38
p-value		<0.001	<0.001	0.019	<0.001	0.016	0.018	0.004
F		4.404	4.703	2.765	7.561	2.835	1.506	3.591

Table 7: Mean score, F and p values for each nudge and emotional response.

		t-value (sig)						
Nudge Frame	**Groups**	**Afraid**	**Angry**	**Hateful**	**Bitter**	**Resentful**	**Scared**	**Worried**
Neutral	Local Site-International site	-3.26*	-2.34*	-3.93*	-3.69*	-4.22*	-2.94*	-1.83
Negative	Local Site-International site	-0.75	0.73	-0.06	-0.172	-0.127	-0.752	-0.527
Positive	Local Site-International site	-1.327	-1.648	-1.598	-1.03	-3.473*	-3.007*	-0.894

**p<0.05; scales are reversed so a negative sign indicates a stronger emotional response*

Table 7a: Comparison of Emotional Response (using t-value) for Indian vs UK heritage sites, based on different nudge frames

Discussion

The findings of this three-stage study offer important insights into how digital innovation can enhance responsible behaviors in cultural heritage tourism contexts. The findings from qualitative data highlight that heritage organizations increasingly recognize the value of digital innovation — particularly generative-AI-driven nudges — as an emerging managerial tourism practice aimed at shaping visitor responsible behaviors. These interventions operate similarly to performance monitoring and behavioral guidance systems within firms, aligning with calls in the productivity literature emphasizing the value of operational oversight, incentive structures, and targeted communication (Bloom et al., 2012; Chatterjee, 2023). By presenting emotionally resonant, culturally accurate messages, AI nudges encourage visitors to comply with preservation norms, reducing physical deterioration and maintenance expenditures. This suggests that digital nudging functions as a non-intrusive management instrument with direct productivity implications, such as increasing donations or volunteering activities. The findings indicate that the frames have a profound effect on the respondents behaviour (table 7) in terms of emotional response (ER).On contrasting responses, based on exposure to sites with neutral nudges from India or the UK (table 7a) a consistent and stronger emotional response was observed for images from India. Considering that all the respondents were Indians, the above can be interpreted in reference to Social Identity theory (Tajfel et al., 2004) which posits that a person creates in their mind the concept of in-group and out-group and imparts a part of their self concept based on this idea. Thus, for the respondent from India, communication about heritage site from UK does not impact their self-concept as much which is reflected in reduced ER. However, the same is not applicable for negatively framed nudges, as for such communication, the self-identity pathway is bypassed, through threat detection due to negativity bias (Baumeister et al., 2001), exerting a disproportionately stronger emotional response compared to neutral ones. Results for positive nudges (table 7a) present a mixed picture

with Indian sites creating a grater impact on factors such as 'resentfulness' and 'scared' but not on the other emotional subcomponents. This pattern can be interpreted through the combined lens of social identity and moral foundations (Graham et al., 2013). Heritage sites associated with one's own cultural group are more likely to activate moral concerns related to loyalty and collective responsibility. In this context, positive messages emphasizing preservation may implicitly highlight gaps in collective action, eliciting low-intensity moral emotions such as resentfulness rather than stronger reactions such as anger or hostility. This proposition however, can be further investigated in future research.

Furthermore, Goodwin (2021) wrote in his article, '*Why sustainable tourism failed?',* that it has not been fully achieved yet, and explored the reasons behind this failure. He identified issues like lack of political will, focus on economic and social aspects over environmental ones, lack of promotion and awareness and a need for more credible research. The author suggests that instead of relying on governments, we should all take more responsibility for sustainable, responsible tourism practices. Therefore, adopting new technologies in promoting responsible tourism behaviour is paramount specially for cultural heritage sites. For instance, adoption of GAI-driven nudges can enable emotional tone optimization, calibrating messages that appeal to empathy, pride, or legacy depending on the target audiences of the cultural heritage site. Moreover, GAI-driven nudges allows cultural heritages sites to market stewarship, aligning revenue, preservation and moral agency in their communication strategy. In this study, these emotional responses to GAI-driven nudges (positive, negative, and neutral) were found to significantly influence tourists' engagement with cultural heritage, leading to increased responsible behaviours, such as donations, volunteering, or sharing positive reviews on social media. From a managerial perspective, the findings suggest that AI-driven, emotionally framed nudges can enhance productivity not merely

through cost avoidance or resource savings but through specific operational efficiencies such as augmented revenue streams (Hall and Mairesse, 1995). For example, in cultural heritage tourism platforms, AI-driven nudges may reduce customer service workload by pre-emptively addressing visitor concerns, increase conversion rates for responsible tourism offerings, and lower reputational risk associated with culturally insensitive content. To compute these productivity gains, managers can look to cost-reduction metrics in site maintenance and labor allocation. For instance, empirical studies in behavioral governance suggest that digital nudges can reduce physical site degradation - such as littering or unauthorized access - by as much as 15% to 20% (Lehner et al., 2016). By automating these behavioral interventions through GAI, heritage sites can transition from 'reactive labor' (manually cleaning or patrolling) to 'value-added services'. If a site with a $500,000 annual maintenance budget can reduce remediation costs by even 10% through AI-driven compliance, it effectively reallocates $50,000 toward conservation or visitor education without increasing the total budget (McKinsey and Company, 2023). Furthermore, using AI to automate the creation of these nudges reduces 'content revision cycles' by up to 70% (Gartner, 2023; IBM, 2023), allowing marketing teams to produce high-volume, personalized engagement at a fraction of the traditional human-capital cost. Moreover, managers could evaluate such benefits using concrete metrics such as engagement duration, click-through rates on responsible tourism recommendations and complaint frequency. It is important to note that the engagement and responsible tourism outcomes examined in this study reflect intention-based responses rather than directly observed behaviors. As such, the results capture the psychological and emotional mechanisms through which AI-driven nudges shape tourists' readiness to engage in responsible cultural heritage tourism, particularly at the information and evaluation stage of decision-making. This finding aligns with prior research that emphasizes the importance of

emotional engagement in fostering responsible tourism behaviours (Hosany et al., 2020; Su et al., 2013).

Moreover, these emotional responses are dependent on the type of nudge delivered via GAI, with negative nudge being particularly effective in evoking strong emotional reactions. For instance, a negative nudge that highlights the negative consequences of irresponsible tourism behaviors, such as damage to cultural heritage sites or negative impacts on local communities, can evoke feelings of guilt, shame, or fear, which can motivate individuals to change their behaviors. This finding aligns with existing literature, which suggests that negative emotional framing, such as fear or guilt, can significantly impact behaviors by triggering more immediate and intense responses (Amatulli et al., 2019). Studies by Brennan et al. (2010) further demonstrate that negative framing, especially those designed to evoke fear or guilt, often leads to corrective behaviors as individuals seek to alleviate the discomfort caused by these emotions. In this research, *negative nudges* provoked emotions such as bitter, hateful or afraid, driving participants to adopt more responsible behaviours, such as respecting cultural norms or avoiding environmentally harmful practices at heritage sites. These results are consistent with the concept of 'loss aversion' in behavioral economics, where individuals are more motivated by the fear of losing something valuable (in this case, cultural heritage or environmental quality) than by the potential for gain (Tversky et al., 1981). The negative nudge becomes a powerful tool for activating the automatic, emotion-driven system, influencing tourists to engage in behaviour that aligns with responsible tourism (Thaler et al., 2008). While emotionally negative nudges may be effective in shaping behavioural responses, their use raises significant ethical concerns related to manipulation, autonomy erosion, and affective coercion. In contrast to neutral informational interventions, negative emotional framing can exploit cognitive and emotional vulnerabilities, particularly when deployed through opaque

AI systems. From a managerial standpoint, this underscores the importance of ethical guardrails such as transparency disclosures, opt-out mechanisms, and periodic auditing of AI-generated content to prevent manipulative practices. Without such safeguards, the deployment of negative nudges risks undermining consumer trust and may expose organizations to reputational and regulatory consequences. Beyond these concerns, the use of generative AI in cultural heritage tourism introduces additional ethical risks. Generative models trained on large-scale datasets may inadvertently reproduce cultural biases or historically inaccurate representations, potentially misrepresenting heritage sites or reinforcing stereotypical narratives (Bruno, 2021). Such distortions can be particularly problematic in cultural heritage contexts where authenticity and respectful representation are central to visitor experience and community identity. In addition, the personalization capabilities of AI-driven nudges often rely on behavioural data collected through tourism platforms, raising data privacy and consent concerns if visitors are unaware of how their information is used to generate persuasive content (Zuboff, 2023). Addressing these risks requires responsible AI governance practices, including culturally informed dataset curation, transparent disclosure of AI-generated imagery, and privacy-conscious personalization mechanisms to ensure that AI-enabled behavioural interventions remain both effective and ethically responsible.

Moreover, the study confirmed that these emotional responses lead to a promising engagement in cultural heritage tourism which directly enhances responsible tourism behaviour. This suggests that tourists who feel more emotionally and culturally connected to heritage sites are more likely to engage in pro-social behaviour like writing reviews online, posting comments on social media and even WOM or recommending their friends or family about cultural heritage tourism. Such increased engagement not only benefits the tourism industry but also contributes to the preservation and conservation of cultural heritage sites (Gong et al., 2019). By raising awareness

and fostering a sense of responsibility among tourists, GAI-driven nudges can help ensure that these invaluable sites are protected for future generations. However, the emotional response is influenced by a number of factors that were tested in this study. The moderating effect of cultural identity, perceived cultural accuracy and AI hallucination potential on emotional responses and engagement were found to be less significant than expected. This suggests that while cultural identity is important, its influence may not be as strong as the emotional framing of the AI-driven nudges themselves. This finding opens an interesting avenue for further research, particularly in cross-cultural settings, to explore the nuanced role of cultural identity in shaping tourist behaviour. Furthermore, this study tested the effect of cultural identity, perceived cultural accuracy and AI hallucination potential on emotional responses and engagement as moderators which acted as the conditional factors through which GAI-driven nudges influenced responsible tourism behaviours. At the same time, the weaker-than-expected moderating effects of cultural identity, perceived cultural accuracy, and AI hallucination potential can be understood in light of the qualitative findings. The interviews suggested that emotional salience and moral framing was prioritized over individualized cultural tailoring in day-to-day communication, which helps explain why emotional framing exerted stronger influence than stable individual differences in the experimental results. Rather than undermining the theoretical model, these findings refine it by indicating boundary conditions under which emotional nudges may override cultural predispositions at the intention-formation stage. Moreover, this finding suggests that when an individual is exposed to an GAI generated image for a cultural heritage site, their cultural identity plays a part in evoking emotional response. If an individual is more connected to their roots and culture, then they can relate to the GAI image which in turn can evoke stronger emotional responses (Yang et al., 2022). This

emotional response, in turn, positively influences an individual's perceptions of the accuracy of the cultural representation, reinforcing the authenticity of the heritage site generated by GAI (Park et al., 2019). Additionally, if the GAI generated images are termed as accurate and authentic depiction of the cultural heritage site, then this will lead to an enhanced engagement towards cultural heritage tourism and responsible tourism behaviours. The study also identified potential limitations with AI hallucination, as its impact on emotional responses and engagement was insignificant. This underscores the need for continued attention to the ethical use of AI in tourism to avoid misinformation and ensure cultural accuracy, as highlighted by Williamson et al. (2024). By validating cultural narratives and continously oversight, cultural heritage sites can co-create AI-driven nudges that protect cultural identity, ensure messages accuracy and enhance responsible tourism.

Contributions

To Literature: This study makes a significant contribution to the academic literature on responsible tourism and engagement by examining the role of Generative AI (GAI) in fostering sustainable practices in cultural heritage tourism. By exploring the intersection of GAI-driven engagement and nudge theory, the study fills an important gap in the literature for GAI, emotional responses, engagement in cultural heritage tourism and responsible tourism. Traditionally, responsible tourism aims to minimize negative impact on destinations while maximizing benefits for local communities (Goodwin, 2016). By integrating Generative AI, the study bridges the gap on how GAI-driven nudges can evoke emotional responses that lead to more ethical tourism behaviour, such as donations, volunteering, or promoting cultural sites via social media or Word-

of-Mouth. From a theoretical perspective, this study contributes to the expanding literature on digital nudging by demonstrating how emotionally framed, AI-generated messages can influence affective and engagement outcomes, even in the absence of structural changes to choice architecture. This study also contributes to the Nudge theory, introduced by Thaler and Sunstein (2008), which suggests that indirect suggestions, or "nudges," can significantly alter people's decisions without restricting their freedom of choice. The integration of GAI, which leverages GAI's ability to detect, interpret, and respond to human emotions, introduces an additional layer to this behavioural dynamic. In the case of cultural heritage tourism, AI is used to gently steer tourists toward actions that align with responsible tourism, such as supporting local communities or minimizing environmental impact. The integration of AI into this framework represents a novel application of technology in driving sustainable yet responsible tourism practices. Furthermore, this study introduces GAI-driven engagement as a new model for understanding user interaction in cultural heritage tourism. Previous studies have explored how tourist experiences are shaped by physical environments and cultural narratives (Smith, 2015), however, this research adds a technological layer by demonstrating how GAI can enhance emotional responses and engagement, leading to stronger connections with cultural heritage. By personalizing interactions based on real-time emotional feedback, GAI can create more meaningful tourist experiences that foster a sense of cultural identity and responsibility. Methodologically, this study further contributes by explicitly distinguishing between the overall effect of GAI-driven nudges on emotional responses and the differential impact of nudge framing. By systematically comparing positive, neutral, and negative framing conditions within a controlled experimental design, the study clarifies how emotional valence operates in digital nudge contexts. Importantly, the findings demonstrate that

negatively framed nudges do not necessarily produce undesirable outcomes, but instead evoke stronger affective responses (e.g., concern or responsibility) that can motivate pro-social and responsible tourism behaviour. This resolves conceptual ambiguity in prior research regarding the role of emotional valence in shaping behavioural outcomes.

To Practice: From a practical perspective, the study offers crucial insights for cultural organizations like local tourism authorities about how to incorporate GAI to promote cultural heritage sites and responsible tourism. Moreover, this study also offers a deeper understanding for AI developers on how to design culturally sensitive GAI interventions. As the use of AI becomes more prevalent across industries, the importance of ensuring that these technologies are designed with cultural sensitivity cannot be overstated. This is particularly relevant in the context of cultural heritage tourism, where an GAI's ability to engage visitors with culturally relevant nudges can significantly impact visitor experiences, behaviour and engagement (Nowak et al., 2024). One key insight from this study is that GAI developers must consider cultural differences when designing algorithms that interact with users. This research highlights the need for GAI to adapt to local customs, traditions, and emotional cues to ensure that the messages it delivers resonate with the target audience. By tailoring GAI nudges to align with the emotional and cultural context of their audiences, developers can create more engaging and effective interventions. For instance, in the case of promoting responsible tourism in India, GAI systems could emphasize the spiritual and communal aspects of Indian culture, which are deeply connected to the country's heritage and can drive prosocial behaviours like volunteering or donations or even promoting the site via social networking sites (SNS) (Hsu et al., 2022). For cultural organizations, this research underscores the

importance of using GAI to foster deeper emotional connections between visitors and cultural heritage sites. GAI-driven interventions that evoke emotional responses can make visitors feel more connected to the cultural narratives presented, enhancing their overall experience and engagement towards cultural heritage tourism which in turn leads to responsible tourism (Rasoolimanesh et al., 2024). Moreover, GAI systems can nudge tourists toward more responsible practices, such as reducing litter or supporting local artisans, by showing them the immediate consequences of their actions. In this way, GAI becomes a tool not only for enhancing engagement but also for promoting responsible and sustainable tourism practices. Furthermore, while AI hallucination potential did not significantly dampen emotional engagement in this experimental context, its non-significance highlights a critical 'trust trap' for tourism practitioners. The findings suggest that users may heuristically overlook factual inaccuracies when presented with emotionally evocative GAI imagery which is consistent with research showing that individuals often rely on heuristic cues such as visual realism or emotional resonance when interacting with AI-generated content rather than verifying factual accuracy (Sundar, 2020; Logg et al., 2019). To mitigate this, business applications must implement 'Human-in-the-Loop' (HITL) verification protocols, where AI-generated content is audited by heritage experts for historical and architectural accuracy before public deployment. Empiricalstudies in AI governance suggest that human oversight significantly improves the reliability and accountability ofautomated decision systems, particularly in culturally sensitive domains (Dwivedi et al., 2023). Furthermore, organizations should adopt Retrieval-Augmented Generation (RAG) frameworks that ground GAI outputs in verified historical databases rather than relying on the model's internal weights alone which has been shown to substantially reduce hallucination rates in large language models (Lewis et al.,

2020; Ji et al., 2023). Finally, the use of 'AI-Verification Watermarks' can protect organizational reputation, ensuring that idealized AI-generated visuals are clearly distinguished from documented historical reality, thereby maintaining long-term institutional credibility (Kirchenbauer et al., 2023). Collectively, these strategies highlight the importance of hybrid governance systems that combine algorithmic capabilities with expert validation to ensure both persuasive effectiveness and informational integrity in GAI-driven tourism communication.

To Policy: The findings from this study can serve as a valuable resource for policymakers looking to develop frameworks for the use of GAI in cultural heritage tourism. Given the growing role of AI in various sectors, it is essential for governments and regulatory bodies to ensure that these technologies are used ethically and in ways that benefit society. One of the main policy implications of this research is the need for guidelines that ensure the cultural accuracy of AI systems. AI algorithms often rely on large datasets that may not fully capture the nuances of specific cultural contexts, leading to what is known as "AI hallucination"—where AI generates false or misleading information (McIntosh et al., 2023). Policymakers must therefore establish frameworks that require AI systems to be trained on culturally relevant data and subject to regular audits to ensure their outputs are accurate and respectful of cultural heritage (Floridi et al., 2018). This is particularly important in the context of tourism, where AI is often used to provide recommendations or information to tourists about heritage sites. In addition to ensuring cultural accuracy, policymakers should focus on creating standards for AI transparency and accountability. The tourists need to trust that the AI systems they interact with are not only accurate but also reliable and free from biases. Transparency in how AI algorithms make decisions—such as what

data they use and how they weigh different variables—can help build this trust (Schmidt et al., 2020). Lastly, policymakers should encourage the development of GAI systems that promote public engagement with cultural heritage sites. By supporting initiatives that use GAI to enhance visitor experiences, governments can contribute to the preservation of cultural heritage while also boosting tourism. For example, policies that offer grants or incentives for cultural organizations to adopt AI technologies could spur innovation in this area, leading to more dynamic and engaging responsible tourism experiences. By establishing frameworks that ensure cultural accuracy, transparency, and public engagement, policymakers can harness the potential of AI to promote responsible tourism and cultural preservation.

Limitations and Future Research

There are certain limitations to this research, which must be acknowledged in order to fully understand the findings. The study relies on 25 interviews which may not be sufficient to capture the diversity of perspectives and experiences among Indian tourists. Additionally, the findings derived from Indian participants may not be directly applicable to other cultural settings, limiting the generalizability of the results. As this study focuses exclusively on Indian culture, therefore, this study may overlook significant insights that could be gained from exploring other cultural contexts. While the study includes experiments and surveys, it primarily assesses immediate responses to AI-driven nudges. Although the current study utilizes a robust sample from the UK and India sites, the use of continuous moderation rather than Multi-group Analysis (MGA) means that measurement invariance was not formally tested across national boundaries. Future research should expand this framework to other cultural clusters and employ MGA to ensure

that GAI-driven nudges remains invariant across broader global contexts. Additionally, a significant limitation involves the reliance on self-reported survey data, which is susceptible to social desirability and self-report biases. Although the study implemented procedural controls and Harman's single-factor test to mitigate common method bias, participants may still overstate their 'responsible' intentions to align with perceived social norms. To bridge this 'intention-behavior gap', future longitudinal studies should incorporate objective, sensor-verified data - such as geofencing or mobile tracking - to monitor real-world visitor compliance and movement in response to GAI-driven digital triggers on-site.

Moreover, future research can address these issues by incorporating a larger sample size that would enhance the richness and reliability of qualitative data, potentially leading to more generalizable findings (Flick, 2022). Moreover, future research should extend the present model through theory-driven cross-cultural comparisons, for example by explicitly examining how cultural dimensions such as collectivism–individualism or uncertainty avoidance condition the effectiveness of emotionally framed AI-driven nudges (Zhang et al., 2018). Longitudinal designs could further assess whether repeated exposure to AI-driven nudges leads to habituation or reactance over time. Additionally, experimental manipulation of perceived AI transparency and accountability could help disentangle ethical acceptance from behavioural effectiveness in AI-mediated persuasion. Furthermore, a comparative analyses involving different cultural heritages could provide a more comprehensive understanding of how AI nudges influence engagement in cultural heritage tourism across diverse populations (Genkova et al., 2022). Future research should investigate the long-term impact of these interventions on tourists' behaviours, attitudes

and engagement toward responsible tourism (Zhang et al., 2021). Additionally, future research could also explore the integration of Generative AI with immersive technologies such as virtual reality (VR) and augmented reality (AR) in cultural heritage tourism. As immersive tourism platforms increasingly adopt AI-generated environments and narratives, understanding how emotionally framed generative content influences visitor engagement within virtual heritage spaces represents an important avenue for investigation. Longitudinal studies examining repeated exposure to AI-generated cultural narratives in immersive environments could further reveal how trust, authenticity perceptions, and responsible tourism behaviours evolve over time.

Conclusion

This study underscores the transformative potential of Generative AI (GAI)-driven nudges in shaping responsible tourism behaviours, particularly in the context of cultural heritage tourism. This study adopted a three-stage mixed-methods design to progressively build, refine, and test an explanation of how Generative AI–driven nudges influence responsible behaviour in cultural heritage tourism. Rather than treating the qualitative and quantitative components as parallel exercises, the stages were deliberately sequenced to inform one another and to close the loop between contextual understanding, managerial sensemaking, and behavioural testing. The content analysis of media discourse (Stage 1) identified dominant narratives around cultural preservation, moral responsibility, and technological mediation in tourism, highlighting a growing emphasis on emotionally framed appeals rather than purely informational messaging. These narratives provided contextual grounding for the qualitative interviews (Stage 2), where participants articulated how emotionally resonant communication is increasingly used in

practice to influence visitor behaviour while avoiding overt enforcement mechanisms. Together, these stages suggested that emotional framing - rather than structural choice manipulation - would be a critical mechanism through which AI-driven interventions operate in real-world heritage contexts. Building on these qualitative insights, the experimental study (Stage 3) formally tested whether emotionally framed AI-driven nudges systematically influence tourists' emotional responses and engagement intentions. The experimental findings corroborate the earlier stages by demonstrating that emotionally framed nudges, particularly negatively framed messages, evoke stronger emotional responses and higher engagement intentions than neutral framing. This convergence across methods strengthens confidence that the observed effects reflect meaningful behavioural mechanisms rather than artefacts of a single methodological approach.

The findings highlighted that GAI-driven nudges, through emotional engagement, significantly influence tourists' behaviours towards more sustainable and pro-social actions. Emotional responses elicited by the nudges, especially negative ones, were found to be effective in fostering responsible behaviours, such as supporting conservation efforts, sharing positive reviews, and recommending sites to others. The findings related to nudge framing should be interpreted with nuance. While negative nudges were found to elicit more negatively valenced emotional responses compared to positive nudges, this effect was not consistently observed across all conditions, particularly in comparison with neutral nudges. This suggests that the impact of framing is not uniformly directional, but instead reflects a differentiation in emotional responses across conditions. Importantly, the study does not assume that negatively valenced emotions are

inherently more effective. Rather, their influence on responsible tourism behaviour operates indirectly through engagement mechanisms, as demonstrated in the structural model. This highlights that the effectiveness of nudge framing depends on how emotional responses are translated into engagement, rather than on emotional valence alone. The research also reveals that while factors like cultural identity, perceived cultural accuracy, and AI hallucination potential do play a role, their influence is secondary to the emotional impact of the AI-driven nudges. This suggests that effective nudges are about triggering emotions directly and aligning them strictly with a tourist's cultural background or the perceived accuracy of the information about cultural heritage sites. Moreover, the study sheds light on the challenges associated with AI hallucination, underscoring the importance of ethical AI deployment in tourism. While AI hallucination was found to have an insignificant direct impact on emotional responses, it still raises ethical considerations about the accuracy of cultural representations and the potential risks of misinformation. Addressing these challenges is crucial for fostering trust and authenticity in AI-driven tourism experiences, ensuring that tourists receive accurate and meaningful representations of cultural heritage sites. In conclusion, this research contributes to the ongoing discourse on sustainable tourism by highlighting the pivotal role of technology—specifically GAI-driven nudges—in promoting responsible tourism behaviours. The findings emphasize the importance of emotional engagement in driving behavioural change and suggest that GAI technologies, when ethically and effectively utilized, can serve as powerful tools for encouraging sustainable practices in tourism. Future research should continue to investigate the intricate relationship between cultural context and emotional engagement, exploring how different types of nudges may vary in effectiveness across diverse cultural settings. Additionally,

addressing the ethical challenges associated with AI, such as hallucination potential, remains crucial for maintaining the integrity and authenticity of cultural heritage sites in the digital age.

Data Availaibility Statement: The data supporting the findings of this study are available from the corresponding author upon request.

Ethics Statement: All procedures were conducted in accordance with ethical guidelines for human participant research. Participants provided informed consent prior to participating in the interviews.

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APPENDICES

Appendix A – *Literature review table*

Concept	Key work	Key definitions	Theoretical contributions	Theoretical limitations
Nudges	Thaler and Sunstein (2008)	Any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives.	Thaler and Sunstein´s work is credited by emphasizing that there are two dual-system principles that influence consumer decision-making process: reflective and automatic.	Nudge theory raises ethical issues around autonomy and manipulation. Critics argue that nudging can limit individuals' freedom of choice by subtly steering them toward decisions without their conscious awareness.
	Weinmann et al. (2016)	Digital nudging refers to the use of user-interface design elements to guide people's behaviour in digital choice environments.	Weinmann et al´s work broadened the concept of nudging by emphazing its application to digital contexts.	This study is merely conceptual and has not been tested empirically.
	Liu, Y. et al. (2024)		Using the social contagion theory, nudge theory and norm activation theory, this study is credited with investigating how residents' pro-environmental behaviour influence tourists' behaviour,	Focusing solely on nudge theory overlooks other mediating variables, such as the emotional perspective, which could reveal how empathy fosters social contagion between tourists and residents.

Emotional AI	Somers (2019)	A subset of artificial intelligence (the broad term for machines replicating the way humans think) that measures, understand, simulates, and reacts to human emotions. It's also known as affective computing or artificial emotional intelligence	Sommer´s work is credited by highlighting that Emotional AI is a tool for enhancing human-machine interaction by recognizing and responding to emotional cues. It proposes that machines can create more intuitive, personalized experiences.	There's an ethical risk that companies or organizations could use Emotional AI to manipulate users' emotions, influencing decisions or behaviours in ways that serve the interests of the organization rather than the individual, potentially crossing ethical boundaries.
	Mehta, P. et al. (2022)		This meta-analytic review integrates the artificial intelligence literature, addresses inconsistencies, and introduces new constructs to both the Theory of Reasoned Action and the Unified Theory of Acceptance and Use of Technology.	This study is limited by its focus on English-language publications and specific keywords, which may exclude relevant studies. Some moderators had low case numbers, and random effect models might introduce interdependency issues, potentially inflating sample sizes and biasing results.
	Hollebeek, L. D. et al. (2024)		This systematic review of 89 studies, utilizing the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method, synthesizes the AI-based customer engagement literature.	This study relies on the Scopus database, potentially excluding non-English and non-Scopus indexed AI-based CE articles. Additionally, due to AI's rapid evolution, some relevant studies or emerging terms may not be captured in this systematic review.

Responsible Tourism	Holden et al. (2013)	The objective of responsible tourism is to alter the way in which businesses, tourists and other stakeholders behave, encouraging them to become 'responsible'.	Holden and Fennell explore both ecocentric (environment-centered) and anthropocentric (human-centered) views, contributing a nuanced discussion on sustainable tourism. By balancing these perspectives, they help frame tourism as both a potential threat to and an opportunity for environmental conservation.	Despite its attempt to offer global insights, much of the research and case studies are centered on Western contexts, which may not fully capture the nuances of environmental tourism issues in non-Western regions or developing nations.
	Caruana et al. (2014)	Responsible Tourism is understood as a broad set of tourist interactions that engage with and benefit local communities and minimize negative social and environmental impacts.	The study provides an industry-grounded definition and highlights heterogeneity in tourists' own constructions of responsibility; emphasizes experiential and identity aspects (inner vs. outer-directed goals).	The study mainly focused on subjective accounts and narrative construction rather than on universal definitional criteria. Furthermore, there is limited empirical generalizability beyond narrative context.
	Burrai et al. (2019)	Responsible tourism is an ideological and socio-political construct rooted in sustainability and capitalism that shapes how stakeholders make sense of tourism's role in addressing global issues.	The study provides a critical reconceptualisation of responsible tourism as ideology rather than just practice. It uses Žižek's framework to interrogate foundational policy texts.	Conceptual focus limits empirical applicability and it does not offer operational behavioral definitions. Moreover, abstract framing may not align with models of tourist choice and action.

Cultural Identity	McIntosh et al. (2002)	McIntosh et al. (2002) define cultural identity as the shared sense of belonging to a group that derives from a common set of values, beliefs, traditions, and customs. This identity is often expressed through tangible cultural elements, such as art, music, architecture, and rituals, and intangible elements, including language, stories, and social practices.	The authors explore how a tourist's own cultural identity affects their motivations and experiences. This perspective underscores the idea that cultural identity can influence which destinations tourists choose, how they engage with the culture, and their perceptions of authenticity.	Although the article is theoretically rich, it lacks comprehensive empirical evidence. The study is largely conceptual, and its theoretical claims are not thoroughly supported by data, which may limit the applicability of its findings in specific tourism settings.
	Safari et al. (2023)	Cultural identity is explained as a lived sense of belonging and shared cultural features that can be represented and communicated through cultural products such as batik.	Positions cultural identity as tourism strategy; emphasizes cultural product as experiential commodity; highlights stakeholder roles in promotion.	The study is not strongly grounded in formal theory; limited generalizability; surface treatment of identity dynamics; lacks critical engagement with commodification.
	Urošević (2012)	Cultural identity is defined as the collective expression of local heritage, traditions, and historical narratives that differentiate a destination within global tourism markets.	Demonstrates the tension between globalization and local identity preservation; shows how cultural tourism can both sustain and transform local identity; highlights identity as strategic resource in heritage positioning.	Single case study limits generalizability; focuses on destination-level identity rather than individual psychological identity; limited discussion of identity's behavioral consequences.

AI Hallucination Potential	Christensen et al. (2024)	The phenomenon in which generative Ai software systems generate fabricated or false information.	Christensen et al.´s work examined if the consumers are actually able to discern AI Hallucination and the reasons for selecting AI technologies over other tourism information sources, such as aggregated peer review websites like TripAdvisor, government tourism websites, or social media influencers.	The study focuses on context-specific variables from the Technology Acceptance Model (TAM) and Theory of Planned Behavior (TPB) to examine AI software adoption, such as ChatGPT, in tourism decision-making. The main limitations include restricted scope and space, limiting the inclusion of other potential variables that might explain further variance in users' intentions to adopt this technology.
	Williamson, S. M. and Prybutok, V. (2024)		This study reviews current research on AI's challenges and opportunities, highlighting the importance of responsible AI practices. It emphasizes the need for regular training, active engagement, and experience-sharing among AI users to mitigate risks and develop best practices.	It highlights the need to develop more robust techniques to detect and correct AI hallucinations in real time, as well as understanding their root causes.
	Brewer, J. et al. (2024)		This study contributes to the discussion on ethical AI use and explores how blockchain can improve AI's reliability and accountability for organizations.	This study is merely conceptual and has not been tested empirically.

Perceived Cultural Accuracy	Park et al. (2019)	Extent to which individuals believe that a representation (e.g., in media, tourism, or heritage sites) authentically reflects the traditions, values, and characteristics of a particular culture	The study has identified that tourist satisfaction from experiencing constructive and existential authenticity is a strong indicator of their intention to revisit.	The sample was restricted to visitors of Hahoe Village in Andong City, and the study's timeframe is confined to a single cross-sectional point.
	Waitt (2000)		Waitt´s work is credited by examining how factors such as gender, income, education, and previous visits influence perceptions of authenticity at historical sites.	The sample was restricted to a single historical site in Australia.

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Appendix B - *Interview guide*

S. No.	Interview Questions
1.	Have you ever visited any cultural heritage site? Share your experience
2.	What was the first thing that came to your mind when you saw the site?
3.	Can you explain why you felt that way?
4.	What intrigued you most about the site?
5.	Between a UK based cultural heritage site and that of India, which heritage site would you prefer visiting?
6.	What is the underlying reason?
7.	Here is an image of an Indian cultural heritage site generated by AI. What elements in the image seem authentic to you, and where do you see inaccuracies?
8.	How would these inaccuracies affect your overall perception of the site?
9.	How do you typically decide which cultural heritage sites to visit?
10.	How does a visit to cultural heritage site differ from a visit to any other tourist location in terms of your expectations and motivations?
11.	Do you check online reviews or consider WOM for platforms like Booking.com or Expedia while booking a place? Which one is important?
12.	What does 'Responsible Tourism' mean to you?
13.	How according to you should a responsible tourist destination differ from other tourist destinations in your mind
14.	Are there specific practices (e.g., preservation efforts, eco-friendly tourism) that you look for in a destination?
15.	How important is sustainability to you when choosing cultural heritage sites to visit?
16.	In your opinion, how can tourists contribute to the responsible tourism of cultural heritage sites? What actions do you take to ensure you're being a responsible tourist?
17.	What does culture mean to you, and does it influence your travel choices?
18.	Can you describe a memorable experience you've had while visiting a cultural heritage site? What made it stand out to you?
19.	Do you feel a strong connection to your own cultural heritage when visiting certain sites? How does this connection or lack of it shape your travel preferences?
20.	What factors make you feel more connected or engaged with a cultural heritage site?
21.	Walk me through your planning stage for your upcoming tour. How much do you rely on other people's reviews or social media posts when deciding whether to visit a cultural heritage site?
22.	When you visit a cultural heritage site, how likely are you to share your experience with others, either through social media, reviews, or in person? What motivates you to do so?
23.	What are your thoughts on AI-generated content about cultural heritage sites?

24.	Have you ever encountered misleading or inaccurate information about a cultural heritage site online? How did that affect your perception or decision to visit?

Appendix C – *GAI generated images by Adobe Firefly*

Preserving *heritage sites* by volunteering, visiting, or donating is essential to maintaining the cultural identity and historical knowledge of *the place*. This site connects us to the past of *the* tribal *communities of the location*, promote its tourism and boost local communities. Protecting them ensures future generations can experience and learn from their rich legacy and traditions

Appendix C(1): Indian Cultural Heritage Site (Neutral Message Stimulus)

Failing to preserve *heritage sites* through volunteering, donating, or visiting means losing irreplaceable history and culture forever of *the place*. Its destruction erases stories, traditions, and identities, leaving a haunting void. *The* tribal community of the location would lose their roots, leaving the site as ruins—a grim reminder of a forgotten past that cannot be reclaimed.

Appendix C(2): Indian Cultural Heritage Site (Negative Message Stimulus: Fear nudge)

People like you are helping preserve heritage sites by volunteering, donating, or visiting. Thanks to their efforts, we have been able to redeem such sites to its past glory. These actions protect history, boost tourism, support the local community of the location, and keep their cultural stories of the place alive for future generations.

Appendix C(3): Indian Cultural Heritage Site (Positive Message Stimulus: Social Influence nudge)

Preserving heritage sites by volunteering, visiting, or donating is essential to maintaining the cultural identity and historical knowledge of the place. This site connects us to the past of the local communities of the location, promote its tourism and boost local communities. Protecting them ensures future generations can experience and learn from their rich legacy and traditions

Appendix C(4): UK Cultural Heritage Site (Neutral Message Stimulus)

Failing to preserve heritage sites through volunteering, donating, or visiting means losing irreplaceable history and culture forever of the place. Its destruction erases stories, traditions, and identities, leaving a haunting void. The local community of the location would lose their roots, leaving the site as ruins—a grim reminder of a forgotten past that cannot be reclaimed.

Appendix C(5): UK Cultural Heritage Site (Negative Message Stimulus: Fear nudge)

People like you are helping preserve heritage sites by volunteering, donating, or visiting. Thanks to their efforts, we have been able to redeem such sites to its past glory. These actions protect history, boost tourism, support the local community of the location, and keep their cultural stories of the place alive for future generations.

Appendix C(6): UK Cultural Heritage Site (Positive Message Stimulus: Social Influence nudge)

Appendix D – *Prompts used for AI-Generated Nudges*

Prompt ID	Country	Nudge Type	Tool	Prompt Text	Output Type	Notes / Parameters
1	India	Positive	Adobe Firefly	"Generate an image of a cultural heritage site in India like a temple shown in a well-maintained state". Follow-up prompts: "The architecture should be detailed with clean stonework, vibrant cultural elements showing beautiful surroundings" ; "Include visitors observing quietly and signs of promoting preservation. The atmosphere should be uplifting, culturally rich and socially valued with warm natural lighting".	Image	Historical reconstruction, realistic style
2	India	Neutral	Adobe Firefly	"Generate an image of a cultural heritage site in India In its current everyday state". Follow-up prompts: "The site should appear neither restored nor deteriorated, with no visible damage or neglect"; "Show accurate architectural features and surroundings under neutral daylight conditions" ; "Avoid emotional cues, vibrant lighting, crowds, signs of decay or preservation efforts".	Image	Realistic style, neutral tone
3	India	Negative	Adobe Firefly	"Generate an image of a cultural heritage site in India in ruins, showing broken structures, debris, and overgrown vegetation" Follow-up prompts: "Generate visible cracks, debris, litter and eroded broken structure" ; "The surrounding should feel uncared for, with dull, dim or harsh lighting and grey clouds - an	Image	Extreme decay, realistic style

				atmosphere of decline" ; "Avoid people or restoration activities to emphasize abandonment and the consequences of irresponsible tourism"		
4	UK	Positive	Adobe Firefly	"Generate an image of a cultural heritage site in the UK like an old castle as it used to look in the past, showcasing well-maintained structures and cultural richness" Follow-up prompts: "The architecture should be detailed, clear and preserved with clean surroundings and subtle indicators or care and conservation" ; "Now include calm, respectful visitors and contextual elements suggesting collective appreciation for the site" ; "Use natural lighting to convey cultural pride, continutity and social responsibility"	Image	Historical reconstruction, realistic style
5	UK	Neutral	Adobe Firefly	"Generate an image of a cultural heritage site in the UK in its current, everyday condition" Follow-up prompts: "Generate a neutral state, without emphasizing decay or restoration" ; "Use balanced daylight, accurate architectural representation and minimal human presence" ; "Avoid dramatic contrast, decay and enhancement in image"	Image	Realistic style, neutral tone

6	UK	Negative	Adobe Firefly	"Generate an image of a cultural heritage site in the UK in a visibly deteriorated condition" Follow-up prompts: "Now add structural damage such as crumbling stone, graffiti, litter and signs of long-term neglect." ; "The setting should feel uncared for and declining with gloomy lighting and grey clouds" ; "Exclude visitors and conservation efforts to emphasize loss, risk and the consequence of neglect"	Image	Ruined state, realistic style
7	India	Positive	ChatGPT	"Write a text-based nudge encouraging responsible behavior at Indian cultural heritage sites by highlighting their beauty and historical significance in a positive tone"	Text	Positive framing, aligned with experimental condition
8	India	Neutral	ChatGPT	"Write a neutral text-based description of an Indian cultural heritage site, providing factual information without emotional framing"	Text	Neutral framing, factual
9	India	Negative	ChatGPT	"Write a text-based nudge warning about the negative consequences of neglect and irresponsible behavior at Indian cultural heritage sites, in a fearful tone"	Text	Negative framing, fear-based
10	UK	Positive	ChatGPT	"Write a text-based nudge encouraging responsible behavior at UK cultural heritage sites by highlighting their beauty and historical significance in a positive tone"	Text	Positive framing, aligned with experimental condition
11	UK	Neutral	ChatGPT	"Write a neutral text-based description of a UK cultural heritage site, providing factual information without emotional framing"	Text	Neutral framing, factual
12	UK	Negative	ChatGPT	"Write a text-based nudge warning about the negative consequences of neglect and irresponsible behavior at UK cultural heritage sites, in a fearful tone"	Text	Negative framing, fear-based

Appendix E – *Constructs, items and sources*

Key Constructs	Item Code	Scale Items	Source
Emotional Response	ER8	Hopeful (Removed due to low factor loading)	Marcus et al., 2017
	ER9	Proud (Removed due to low factor loading)	
	ER10	Enthusiastic (Removed due to low factor loading)	
	ER1	Angry	
	ER2	Hateful	
	ER3	Bitter	
	ER4	Resentful	
	ER5	Afraid	
	ER6	Scared	
	ER7	Worried	
Engagement towards Cultural Heritage Tourism	ENG1	I will write a review and/or post pictures on social media sites about cultural heritage tourism to share with my contacts	Majeed et al., 2020
	ENG2	I will write a review and rate my experience on social media sites that can be used by others for their trip to cultural heritage tourism site	
	ENG3	I will write a review and rate my experience on social media sites regarding cultural heritage sites to influence others concerning their choice of destination	
	ENG4	I will encourage more tourists online to travel to the cultural heritage site	
	ENG5	My shared online comments will generate awareness among tourists about the cultural heritage tourism	
Responsible Tourism	RT1	I am willing to pay more for responsible tourism	Chui et al., 2011
	RT2	I am willing to participate in responsible tourism holiday	
	RT3	I am willing to pay more for a holiday if it's guaranteed the money goes to preservation of local environment	
Cultural Identity	CI1	There exists a link between this cultural heritage site and my daily life	Yang et al (2022)
	CI2	I can reflect on the memories attached to this cultural heritage site	
	CI3	Thoughts about this cultural heritage site are part of me	
	CI4	I miss the traditional rituals experienced in this cultural heritage sit	
	CI5	I am proud of this cultural heritage site.	
	CI6	I have strong ties to this cultural heritage site	
	CI7	I know these traditional rituals quite well now	

Perceived Cultural Accuracy	PCA1	The overall architecture and exhibits in the image reflect actual buildings of the heritage site	Park et al., 2019
	PCA2	I could see the architectural style of the era	
	PCA3	I could feel the (real) original authenticity through the experiences in the AI generated image	
	PCA4	I felt connected with human history and civilization	
AI Hallucination Potential	AHP1	AI can generate false information and present it as factual, leading to incorrect decisions or actions	Christensen et al., 2024
	AHP2	AI can make up and create imaginary scenarios that have no basis in reality, leading to confusion and misinterpretation of data	
	AHP3	AI can perpetuate biases and stereotypes of different cultures and customs and peoples, leading to discriminatory outcomes and reinforcing social inequalities.	
	AHP4	AI can make erroneous predictions based on flawed or incomplete data, leading to incorrect assumptions and misguided travel and tourism decisions.	
	AHP5	AI can be vulnerable to hacking or manipulation, leading to the dissemination of false or misleading information about travel and tourism.	

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