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THE IMPACT OF AUGMENTED AND VIRTUAL REALITY ON TOURIST SATISFACTION AND INTENTION TO RETURN: THE MEDIATING ROLE OF CULTURAL APPEAL IN NEOM

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ABSTRACT

This study explores how augmented reality (AR) and virtual reality (VR) influence tourist satisfaction and intention to revisit NEOM, an emerging smart destination in Saudi Arabia, from a sustainable tourism perspective. The research extends the Technology Acceptance Model (TAM) to examine how perceived usefulness, perceived ease of use, and perceived innovativeness shape tourists' evaluations of immersive destination experiences. Cultural appeal is further examined as a mediating mechanism that enhances emotional engagement and supports culturally sustainable tourism development. Data were collected from 390 respondents who experienced AR/VR-enabled destination content related to NEOM. The proposed relationships were tested using regression analysis and bootstrapping techniques. The findings indicate that positive perceptions of AR/VR technologies significantly enhance both tourist satisfaction and intention to return. In addition, cultural appeal partially mediates this relationship, suggesting that immersive technologies are most effective when they communicate authentic cultural narratives and destination identity. The results highlight the role of AR and VR in supporting sustainable tourism by enriching cultural understanding, strengthening emotional attachment to destinations, and fostering long-term visitor loyalty while reducing pressure on physical resources. Overall, this study emphasizes the importance of culturally grounded immersive technologies in shaping sustainable and experience-driven tourism development within emerging smart destinations.

KEYWORDS: Augmented Reality, Virtual Reality, Tourist Satisfaction, Intention to Return, Cultural Appeal, Smart Tourism, NEOM.

1. INTRODUCTION

Tourism has become as a strategic motive of sustainable economic diversification worldwide, contributing to employment creation, regional development, and cultural exchange when supported by innovation and smart destination management (Gretzel et al., 2015; Neuhofer et al., 2015). Globally, the tourism sector accounts for approximately 10% of total employment, and its long-term sustainability increasingly depends on the adoption of digital technologies that enhance experiential value while mitigating environmental and cultural pressures associated with mass visitation (UNWTO, 2022).

Within this global context, the Kingdom of Saudi Arabia has positioned tourism as a central pillar of national transformation under Saudi Vision 2030. The national tourism strategy aims to attract 150 million domestic and international visitors annually by 2030, increase tourism's contribution to gross domestic product to approximately 10%, and generate more than 1.6 million jobs across the tourism sector (Ministry of Tourism, 2024; UNWTO, 2023). These objectives reflect a strategic shift toward experience-based, culturally grounded, and technology-enabled tourism development aligned with sustainability principles.

Among the pioneering initiatives supporting this transformation is NEOM, a large-scale smart destination designed to integrate sustainability, digital innovation, and cultural value creation. NEOM's development strategy emphasizes immersive and technology-driven tourism experiences as key mechanisms for communicating destination identity and future-oriented cultural narratives. Official planning documents indicate that NEOM aims to attract up to five million visitors annually by 2030, positioning it as a major contributor to national tourism growth and a testing ground for smart and sustainable destination models (NEOM Company, 2023). Unlike traditional heritage destinations, NEOM represents an emerging tourism context in which cultural meaning and visitor experiences are actively constructed through digital technologies rather than inherited through long-established tourism practices.

In this regard, immersive technologies—particularly augmented reality (AR) and virtual reality (VR)—have gained increasing relevance in tourism development and destination marketing. Industry reports estimate that the global AR/VR market exceeded USD 30 billion in 2023 and is projected to surpass USD 100 billion by the end of the decade, with tourism, cultural heritage, and

destination promotion among the fastest-growing application areas (PwC, 2023; Statista, 2024). In tourism contexts, AR and VR enable destinations to deliver interactive and emotionally engaging experiences by overlaying digital content onto physical environments or by creating fully immersive virtual simulations (Guttentag, 2010; Wei, 2019). From a sustainability perspective, these technologies also contribute to resource efficiency by reducing physical congestion and enabling virtual access to culturally and environmentally sensitive sites (Wei, 2019).

Empirical tourism research suggests that AR and VR experiences positively influence tourists' experiential quality, destination image, and behavioral intentions by enhancing vividness, emotional involvement, and memorability (Huang et al., 2013; Tussyadiah et al., 2018; Moro et al., 2019). However, much of the existing literature remains largely technology-centric, focusing primarily on usability, system performance, or entertainment value. Consequently, limited attention has been devoted to the psychological and cultural mechanisms through which immersive technologies shape post-experience evaluations and long-term behavioral intentions, particularly in emerging smart destinations (Wei, 2019).

One critical yet underexplored mechanism in immersive tourism research is cultural appeal, which reflects tourists' perceptions of the richness, relevance, and emotional significance of a destination's cultural attributes (Kim & Richardson, 2003; Richards, 2018). Cultural appeal encompasses both tangible elements, such as architecture and heritage, and intangible dimensions, including narratives, symbolism, and cultural atmosphere. Prior studies demonstrate that cultural appeal plays a central role in emotional engagement, memory formation, and destination attachment—factors that strongly influence tourist satisfaction and revisit intention (Richards, 2018; Jung et al., 2021). In digitally mediated environments, AR and VR offer unique opportunities to enhance cultural appeal by visualizing intangible heritage, reconstructing historical contexts, and embedding cultural meaning into immersive storytelling (Han et al., 2018; Jung et al., 2021).

From a theoretical perspective, the Technology Acceptance Model (TAM) has been widely applied to explain individuals' evaluations of digital technologies based on perceived usefulness and perceived ease of use (Davis, 1989). In tourism research, TAM has been used to examine tourists' acceptance of mobile applications, virtual

environments, and smart tourism systems (Ukpabi & Karjaluo, 2017). However, immersive tourism technologies differ from traditional information systems due to their experiential, emotional, and sensory characteristics. Accordingly, recent studies emphasize the importance of incorporating perceived innovativeness to capture tourists' evaluations of novelty and technological advancement, which significantly influence experiential value and destination image (Kamboj et al., 2022; Lee & Oh, 2022)

These theoretical and empirical gaps are particularly evident in the context of NEOM, where tourism experiences are shaped by a combination of digital promotional platforms, pilot immersive applications, and evolving cultural narratives aligned with Vision 2030 objectives (NEOM Company, 2023). Despite NEOM's strategic importance, empirical academic research examining how tourists evaluate AR/VR-enabled destination experiences—and how such evaluations translate into satisfaction and intention to return—remains limited.

To address this gap, the present study investigates how AR and VR destination experiences influence tourist satisfaction and revisit intention, with cultural appeal examined as a mediating mechanism. Drawing on an extended Technology Acceptance Model and empirical data collected from 390 respondents who evaluated AR/VR-enabled promotional and experiential content related to NEOM, this research contributes to the sustainable tourism and smart destination literature by demonstrating how immersive technologies can support culturally grounded experience design and long-term destination loyalty in emerging tourism contexts.

Specifically, this study aims to:

1. examine the effects of AR and VR experiences on tourist satisfaction and intention to return;
2. investigate the mediating role of cultural appeal in the relationship between AR/VR and tourist satisfaction; and
3. assess how cultural appeal influences both tourist enjoyment and willingness to revisit NEOM.

By exploring these relationships within a technologically advanced yet culturally dynamic smart destination, this study contributes to advancing theoretical understanding of immersive tourism experiences and offers practical insights for destinations leveraging AR/VR to enhance cultural value, visitor satisfaction, and long-term loyalty.

2. LITERATURE REVIEW

2.1. *Immersive Technologies in Smart Tourism Ecosystems*

Immersive digital technologies—most notably augmented reality (AR) and virtual reality (VR)—have become integral to the evolution of smart tourism ecosystems. Unlike earlier generations of information technologies that primarily emphasized efficiency and information delivery, immersive technologies introduce multisensory, interactive, and context-aware dimensions that fundamentally reshape how tourists perceive and engage with destinations (Gretzel et al., 2015; Neuhofer et al., 2015). Through narrative-driven simulations, spatial augmentation, and real-time digital overlays, AR and VR enhance experiential depth and enable destinations to communicate cultural meaning, symbolic value, and emotional resonance in more compelling ways (Guttentag, 2020; Wei, 2019).

Within smart destinations, where digital infrastructures are integrated across physical and virtual environments, immersive technologies facilitate richer interactions with cultural heritage, landscapes, and place-based narratives. These technologies reduce perceived uncertainty, stimulate emotional involvement, and support informed decision-making by offering experiential previews and digitally mediated reconstructions, thereby contributing to destination competitiveness and sustainable experience design (Buhalis & Amaranggana, 2015; Sigala, 2020)

2.2. *Virtual Reality in Tourism Experiences*

Virtual reality (VR) has emerged as a complementary digital tool that enhances traditional tourism promotion strategies by expanding how destinations are communicated and experienced. As part of the broader transformation associated with the Fourth Industrial Revolution, VR operates alongside technologies such as the Internet of Things (IoT) and automation systems to integrate physical and digital environments within tourism ecosystems (Khan, 2024).

Within the field of information and communication technologies, VR represents a major innovation with significant implications for tourism development, particularly in destination marketing and experience design (Guttentag, 2010). By generating interactive three-dimensional environments, VR enables users to experience a strong sense of psychological presence and experiential immersion that extends beyond conventional media formats.

The effectiveness of VR in tourism largely depends on key experiential dimensions embedded within virtual environments. Prior research identifies immersion, interactivity, and navigability as the foundational elements shaping users' sense of telepresence—the feeling of being physically present in a simulated space (Guttentag, 2009; Tussyadiah et al., 2018). Immersion operates at both physical and psychological levels, enabling users to emotionally respond to virtual stimuli as if they were real.

Recent technological advancements, including high-resolution rendering, six-degrees-of-freedom tracking, motion sensors, and haptic feedback, have substantially enhanced experiential realism. As realism increases, VR becomes a powerful destination communication tool capable of generating vivid previews that strengthen destination image, reduce perceived travel risk, and stimulate travel intention through emotional engagement and confidence building (Kim et al., 2020; Hoang et al., 2023; Flavián et al., 2021; Assiouras et al., 2024).

Beyond destination promotion, VR plays an important role in cultural and heritage tourism by reconstructing inaccessible sites, visualizing historical contexts, and communicating intangible cultural elements such as rituals and narratives (Han et al., 2018; Atzeni et al., 2022). In emerging smart destinations, VR functions not only as an entertaining medium but also as an interpretive interface that supports cultural understanding and meaning-making processes. When VR experiences are designed around authentic narratives rather than spectacle-driven novelty, they are more likely to foster destination attachment, satisfaction, and long-term loyalty (Wei, 2019; Kianwatana et al., 2024).

2.3 Augmented Reality in Tourism Contexts

Augmented reality (AR) enhances physical environments by composing and integrating digital elements—such as three-dimensional objects, textual annotations, audio cues, and narrative layers—onto real-world settings in real time, typically via mobile devices or wearable technologies (Ali, 2022). Unlike fully immersive virtual environments, AR maintains tourists' physical presence at the destination while extending perception through contextual digital information. This hybrid interaction enables visitors to interpret cultural and spatial features dynamically, without disengaging from the authentic physical surroundings.

From an experiential perspective, AR facilitates active exploration by shifting tourists from passive observers to participants in meaning-making

processes. By allowing users to trigger content, manipulate visual layers, or follow location-based narratives, AR enhances perceived control, cognitive involvement, and experiential flow. Empirical studies consistently show that AR applications increase engagement, enjoyment, and knowledge retention, particularly in cultural and heritage tourism contexts where interpretation and learning are central to visitor satisfaction (Nortvig et al., 2020; Ramtohol & Khedo, 2024).

In museums, heritage sites, and urban destinations, AR is widely employed to visualize historical narratives, reconstruct lost or inaccessible environments, and communicate intangible cultural elements such as traditions, rituals, and symbolic meanings (Jung et al., 2021). These capabilities allow destinations to layer contemporary experiences with historical and cultural context, thereby enhancing perceived cultural richness and interpretive depth. Importantly, AR can support cultural sustainability by presenting heritage content in situ, reducing the need for physical reconstruction while preserving the integrity of original site

Recent research further suggests that the effectiveness of AR depends not only on technological usability but also on the quality and authenticity of cultural narratives embedded within the application. When AR content is perceived as culturally meaningful and contextually relevant, it strengthens emotional engagement and reinforces tourists' connection to place. Conversely, poorly designed AR experiences that prioritize novelty over narrative coherence may generate short-term interest without contributing to lasting satisfaction or destination attachment.

In smart destinations, AR functions as a strategic interpretive tool that complements VR by enhancing on-site experience design and post-visit memory formation. By integrating digital storytelling with real environments, AR can foster deeper cultural appeal, support sustainable visitor management, and contribute to long-term tourist loyalty.

2.4 AR and VR across the Tourism Journey

Together, AR and VR have emerged as transformative tools across multiple stages of the tourism journey—pre-visit, during-visit, and post-visit—serving simultaneously as experiential innovations and strategic marketing instruments (Fan & Wang, 2012; Hassan, 2022). Destination marketers increasingly employ VR to showcase attractions and cultural experiences prior to travel, while AR enhances on-site engagement through contextual interpretation and gamified exploration, with both technologies continuing to shape post-visit

evaluations by reinforcing memories and emotional connections that influence satisfaction and revisit intention (Mourtzis, 2023; Moro et al., 2019; Ahmed et al., 2025).

This functional distinction suggests that immersive technologies influence tourist outcomes through both cognitive routes—such as perceived information quality and usefulness—and affective routes, including presence, enjoyment, and emotional resonance (Kim & Hall, 2019; Flavián et al., 2021).

2.5. Technology Acceptance Model in Immersive Tourism

The Technology Acceptance Model (TAM) proposed by Davis (1989) remains a foundational framework for understanding individuals' adoption of digital technologies. TAM posits that perceived usefulness (PU) and perceived ease of use (PEU) shape attitudes toward technology and subsequent behavioral intentions. In tourism research, TAM has been widely applied to explain tourists' acceptance of smart tourism technologies and virtual environments (Ukpabi & Karjaluoto, 2017; Venkatesh et al., 2003).

However, immersive technologies differ from conventional information systems due to their experiential, emotional, and sensory characteristics. Scholars therefore argue that TAM must be extended to incorporate experiential and affective evaluations in AR/VR contexts (Huang et al., 2013; Kim et al., 2019). Recent studies further highlight perceived innovativeness (PI) as a critical extension of TAM, reflecting tourists' perceptions of novelty and technological advancement, which significantly influence destination image, emotional involvement, and experiential value (Kamboj et al., 2022; Lee & Oh, 2022).

2.6. Tourist Satisfaction and Revisit Intention

Tourist satisfaction is vastly conceptualized as a cognitive-affective evaluation formed through tourists' comparison between prior expectations and perceived performance of the overall tourism experience (Oliver, 1997). This evaluation encompasses both cognitive appraisals, such as perceived service quality and usefulness, and affective responses, including enjoyment, excitement, and emotional engagement, which together shape perceived experiential value (Szymanski & Henard, 2001). In tourism contexts, satisfaction is particularly experience-driven, as travel consumption is often symbolic and memory-oriented, making emotional responses and perceived

meaning central to tourists' post-experience evaluations (Pine & Gilmore, 1999).

Extensive empirical research confirms that tourist satisfaction is a primary antecedent of revisit intention, destination loyalty, and positive word-of-mouth communication. Satisfied tourists are more likely to develop favorable destination attitudes, stronger emotional attachment, and a higher willingness to recommend the destination to others, thereby supporting long-term destination competitiveness (Chen & Tsai, 2007; Prayag & Ryan, 2012). Revisit intention, in particular, is frequently interpreted as a forward-looking indicator of loyalty because it reflects tourists' willingness to re-invest time and resources in the destination rather than merely expressing retrospective approval (Stylos et al., 2016)

In smart tourism environments, immersive technologies such as augmented reality (AR) and virtual reality (VR) can intensify tourist satisfaction by enhancing both cognitive and affective dimensions of the experience. From a cognitive perspective, immersive technologies reduce uncertainty by providing vivid previews, contextual interpretation, and navigational support, thereby improving perceived information quality and decision confidence (Guttentag, 2020; Tussyadiah et al., 2018). From an affective perspective, immersive experiences foster emotional involvement through presence, vividness, and interactivity, which enhance enjoyment, memorability, and perceived authenticity (Moro et al., 2019; Atzeni et al., 2022).

Recent studies further suggest that immersive technologies strengthen satisfaction by increasing perceived experiential value and destination attachment, particularly when digital experiences are culturally meaningful and narrative-driven (Jung et al., 2021; Wei, 2019). As a result, tourist satisfaction in smart destinations emerges not only from functional efficiency but also from emotionally rich and culturally grounded experiences, which in turn reinforce revisit intention and long-term loyalty

2.7. Cultural Appeal as a Mediating Construct

Cultural appeal is a multidimensional construct that reflects the extent to which tourists perceive a destination's cultural attributes as meaningful, distinctive, and emotionally engaging. It encompasses both tangible elements, such as architecture, heritage sites, and cultural artifacts, and intangible dimensions, including narratives, symbolism, traditions, and the overall cultural atmosphere of the destination (Kim & Richardson, 2003). Grounded in destination image theory,

cultural appeal captures tourists' cognitive evaluations (what tourists know and believe about a destination) as well as affective responses (how tourists feel about it), thereby shaping emotional involvement, memorability, and destination attachment (Baloglu & McCleary, 1999; Richards, 2018).

Prior tourism research emphasizes that cultural appeal plays a critical role in transforming tourism experiences into meaningful and emotionally resonant encounters. Destinations perceived as culturally rich and authentic are more likely to evoke positive emotions, foster deeper engagement, and generate stronger memories, which in turn enhance tourist satisfaction and loyalty-related behaviors (Richards, 2018; Prayag & Ryan, 2012). As a result, cultural appeal functions not merely as a background attribute of destinations but as an active psychological mechanism through which tourists interpret and evaluate their experiences.

In digitally mediated tourism environments, immersive technologies such as augmented reality (AR) and virtual reality (VR) can substantially amplify cultural appeal by enhancing the visibility and accessibility of cultural meanings. AR and VR enable destinations to visualize intangible heritage, reconstruct historical contexts, and embed cultural narratives within immersive storytelling, thereby facilitating deeper meaning-making processes that extend beyond surface-level sightseeing (Jung et al., 2021; Han et al., 2018). Through mechanisms such as presence, narrative transportation, and vivid mental imagery, immersive technologies strengthen tourists' emotional connection to cultural content and increase perceived cultural richness (Tussyadiah et al., 2018; Wei, 2019).

In emerging smart destinations such as NEOM, where cultural identity is not solely inherited but actively constructed and communicated through digital platforms, cultural appeal becomes particularly salient. Immersive experiences serve as key interpretive interfaces through which visitors form initial cultural impressions and emotional bonds with the destination. Consequently, cultural appeal is expected to mediate the relationship between immersive digital experiences and key behavioral outcomes, translating technologically enhanced encounters into higher tourist satisfaction and stronger intention to return. This mediating role highlights how cultural meaning acts as a psychological bridge between immersive technology use and long-term destination loyalty in smart tourism contexts.

2.7.1 Cultural Authenticity

The concept of authenticity is not easy to single out and has long been a focal point of scholarly attention in tourism research, particularly in how it is perceived and acted upon by visitors (Belhassen, Caton, & Stewart, 2008; Kontogeorgopoulos, 2017). The idea of authenticity was first presented as a fundamental theoretical concept in tourism by MacCannell (1973, 1999, 2008), who said that travelers frequently seek for experiences that offer a true connection to the destinations they visit. Researchers are better able to comprehend how visitors see and assess their experiences, as well as how these views impact future actions, by looking at authenticity from a variety of angles.

It is well known that authenticity is a major driving force behind travel and has a big impact on travelers' happiness and engagement (Kolar & Zabkar, 2010a). One distinguishing tendency in modern tourism behavior has been the search for authentic experiences, whether via historical discovery, cultural immersion, or significant local relationships.

By applying authenticity to a range of tourism contexts and examining its relationship with tourism objects (such as destinations and attractions), subjects (such as tourists), and agents (such as tour guides and local hosts), later research has broadened MacCannell's original framework (Reisinger & Steiner, 2006; Xu, Wan, & Fan, 2014). Our knowledge of how perceived authenticity affects travel experiences and behavioral intentions like contentment, loyalty, and readiness to return has increased as a result of these studies. Authenticity is still a fundamental analytical lens in many subfields of tourism today, such as heritage tourism, cultural tourism, and digital tourism, particularly in situations where visitors' actions are strongly linked to how authentic they believe cultural representations to be (Belhassen et al., 2008; Kolar & Zabkar, 2010a; MacCannell, 2008). Authenticity is therefore still crucial to the theoretical advancement and empirical study of tourist research.

Building on the preceding literature, this study is theoretically positioned within the evolving stream of research that seeks to reconceptualize technology acceptance theories in experience-based tourism contexts. While the Technology Acceptance Model (TAM) has traditionally emphasized functional perceptions such as perceived usefulness and perceived ease of use as key determinants of technology adoption (Davis, 1989), contemporary tourism environments require broader theoretical perspectives capable of explaining experiential,

emotional, and culturally embedded outcomes (Gretzel et al., 2020). In this regard, the present research extends TAM beyond its conventional utilitarian orientation by conceptualizing augmented reality (AR) and virtual reality (VR) as experiential enablers that shape tourists' overall destination experiences rather than merely influencing technology usage intentions (Loureiro et al., 2022).

Furthermore, the study advances existing theoretical discussions by introducing cultural appeal as a central mediating mechanism linking immersive technological experiences with tourist satisfaction and intention to return. Unlike prior studies that primarily examine technology acceptance as a direct predictor of behavioral intention, this research positions immersive technologies as experience-shaping mechanisms whose impact emerges through culturally mediated value creation (Pine & Gilmore, 1999; Wei et al., 2019). This perspective shifts the analytical focus from technology use itself toward the quality of the tourism experience generated through digitally enhanced cultural interaction. By integrating technological perceptions with cultural engagement dimensions, the study contributes to bridging technology acceptance theory, experiential marketing perspectives, and sustainable tourism research (Sigala, 2018).

Theoretically, this study contributes to the advancement of technology acceptance research by extending TAM from a technology-adoption perspective toward a culturally embedded experiential framework, demonstrating how immersive technologies create sustainable tourist value through the integration of technological perceptions and cultural engagement. Moreover, positioning the study within the context of NEOM as an emerging smart tourism destination allows the research to provide context-sensitive theoretical insights that enrich current understanding of digitally enhanced tourism experiences. Consequently, the study offers a more comprehensive and holistic explanation of how immersive technologies generate meaningful and sustainable tourist experiences in smart destination environments.

Based on the preceding theoretical discussion, the following section identifies the literature gap and presents the study hypotheses.

2.8. Literature Gap and Hypotheses

Although interest in immersive technologies has grown substantially over the past decade, research examining the psychological and cultural

mechanisms through which augmented reality (AR) and virtual reality (VR) shape tourist experiences remains fragmented. Existing studies on AR/VR in tourism have largely focused on technological performance, entertainment value, or usability factors (Bogicevic et al., 2019; Flavián et al., 2021), yet they provide limited insight into how these technologies influence deeper experiential outcomes such as cultural understanding, emotional engagement, satisfaction, and long-term loyalty—particularly within emerging smart destinations.

Furthermore, while the Technology Acceptance Model (TAM) has been widely applied to explain digital adoption behaviors, its use in destination-level immersive experiences is still underdeveloped. Most TAM-based tourism studies have examined AR/VR adoption in functional contexts (e.g., information search, travel planning), but not in experiential environments where tourists interact with culturally embedded narratives and immersive storytelling. This highlights a theoretical gap in understanding how perceptions of usefulness, ease of use, and innovativeness operate within immersive cultural settings rather than traditional service encounters.

Another critical gap concerns the role of cultural appeal as a mediating mechanism. Although cultural appeal is recognized as a key determinant of destination image, emotional resonance, and memory formation (Kim & Richardson, 2003; Richards, 2018), no prior empirical research has examined whether AR/VR experiences enhance satisfaction and revisit intention through their ability to strengthen tourists' perceptions of cultural richness and authenticity. As destinations increasingly rely on digital tools to construct and communicate cultural identity, understanding this mediating process becomes essential.

Finally, in the context of new smart destinations such as NEOM—where cultural identity is being co-created through digital environments rather than inherited—there is an urgent need to understand how immersive technologies influence tourist perceptions, satisfaction, and behavioral intentions. Despite NEOM's strategic emphasis on AR/VR-enabled tourism, empirical evidence remains scarce regarding how visitors evaluate these experiences and how cultural appeal shapes their responses.

Therefore, this study addresses four key gaps:

- the limited integration of TAM with immersive experience research
- the lack of studies examining AR/VR effects on satisfaction and revisit intention in smart destination environments.

- the absence of empirical testing of cultural appeal as a mediator between AR/VR experiences and behavioral outcomes; and
- The scarcity of research focusing on emerging, digitally constructed destinations such as NEOM.
- By addressing these gaps, the study provides a more comprehensive understanding of how immersive technologies influence tourist experiences and contributes to theoretical advancement at the intersection of technology acceptance, cultural experience, and smart destination development.

Based on the Technology Acceptance Model (TAM) and the literature on immersive tourism experiences, perceived usefulness (PU), perceived ease of use (PEU), and perceived innovativeness (PI) are expected to play essential roles in shaping tourists' evaluations of AR/VR technologies. When immersive systems are viewed as useful, easy to interact with, and technologically novel, they tend to enhance experiential flow, cognitive engagement, and emotional connection, ultimately contributing to higher satisfaction and stronger behavioral intentions.

Moreover, previous research suggests that cultural appeal—reflecting the perceived richness, authenticity, and meaningfulness of a destination's cultural attributes—may drive deeper emotional involvement and reinforce the experiential impact of immersive technologies. AR/VR can strengthen cultural appeal by enabling tourists to visualize heritage narratives, engage with cultural symbolism, and experience reconstructed historical environments. Therefore, cultural appeal is expected to act as a mediating mechanism through which immersive experiences influence satisfaction and intention to return.

Building on the theoretical discussion presented above, the following hypotheses are proposed to examine the relationships among the study variables

- H1: Perceived Usefulness (PU) has a significant positive effect on Tourist Satisfaction and Intention to Return (TSIR)
- H2: perceived Ease of Use (PEU) has a significant positive effect on Tourist Satisfaction and Intention to Return (TSIR)
- H3: Perceived Innovativeness (PI) has a significant positive effect on Tourist Satisfaction and Intention to Return (TSIR).
- H4: Cultural Appeal (CA) has a significant positive effect on Tourist Satisfaction and Intention to Return (TSIR).
- H5: AR/VR destination experiences (X) have a

significant positive effect on Tourist Satisfaction and Intention to Return (TSIR)

- H6: Cultural Appeal (CA) mediates the relationship between AR/VR destination experiences and Tourist Satisfaction and Intention to Return (TSIR).

Based on the Literature Gap and Hypotheses, the following section describes the research methodology used to empirically test the study model

3. Methodological Framework

3.1 The sample size

A sample of visitors to NEOM, a significant developing region inside the Kingdom of Saudi Arabia, participated in the current field research. The sample size was determined using the equation provided below :

$$n = \frac{z^2 p(1-p)}{e^2}$$

Whereas:

Z = the standard scores corresponding to the confidence level 95% which can be used in social research, and the standard level corresponding to the confidence level 95% equals 1.96.

p = Percentage of those who are subject to study in the study population 50%.

(1-p) = Percentage of those who do not have the subject of study in the study population 50%.

e = The amount of error allowed at the estimate of 4% is the percentage of error allowed in social research.

n = sample size

The researcher discovered that 384 members of the target population make up the sample size by using the previously mentioned calculation. The questionnaire was created, and any contradicting or incomplete responses were removed from the collection. 390 genuine questionnaires were acquired by the researcher.

3. METHOD OF CONDUCTING FIELD STUDY

A structured questionnaire created to assess the suggested research hypotheses was used to gather data for this study. To guarantee thorough and trustworthy statistical analysis, the data were then examined using the R statistical software tool.

3.1. Ethics approval was granted by the University of Tabuk Ethics Committee.

Data were collected during March and June 2025. The target population included A sample of visitors to NEOM, a significant developing region inside the Kingdom of Saudi Arabia, participated in the current field research

Data were gathered via an online structured questionnaire disseminated through institutional communication channels and professional networks. Participation was voluntary and anonymous, and no personal identifiers (e.g, names, email addresses, or national ID numbers) were collected. Respondents provided electronic consent before beginning the survey.

3.2. Stages of developing the questionnaire:

The researchers adopted a structured approach in developing the questionnaire, which involved the following steps:

- The questionnaire items were created in alignment with the study's objectives.
- A pilot test was carried out by distributing 75 questionnaires to evaluate the clarity of the questions and confirm that participants could comprehend them easily.
- Based on the pilot test feedback, modifications were made, and the final version of the questionnaire was prepared.
- A total of 430 completed questionnaires were returned, but only 390 were considered valid and used for analysis.
- Given that the sample size determined by the initial formula was 390 participants, and the valid responses totaled 390, the researcher decided to include all 390 responses for statistical analysis, as this number closely reflects the statistical distribution of the population.

3.3. Study Variables

The survey of 30 closed-ended questions on a five-point Likert scale that were methodically grouped under three different categories that matched the goals of the study. The researchers approximated the conversion of ordinal data into interval-level data by calculating the weighted mean for each variable to aid in statistical analysis. This method made it possible to use parametric statistical procedures, such as regression analysis, Pearson's correlation coefficient, and other pertinent inferential approaches.

The table (1) below outlines the study variables,

the corresponding statements for each variable (with the arithmetic mean representing the variables), and the type of each variable.

Table 1: Study variables, measurement statements, and number of items.

| Independent variable | | Statements | # of statements |
|-----------------------|----------------|-----------------|-----------------|
| PU (X ₁) | Perceived | From S1 to S5 | 5 |
| PEU (X ₂) | Perceived Ease | From S6 to S9 | 4 |
| PI (X ₃) | Perceived | From S10 to S14 | 5 |
| AR/VR (X) | AR/VR | From S1 to S14 | 14 |
| Mediator Variables | | Statements | # of statements |
| CA (M) | Cultural | From S15 to S19 | 5 |
| Dependent variable | | Statements | # of statements |
| TSIR (Y) | Tourist | From S20 to S30 | 11 |

The researchers determined the weighted average of the participants' replies using the Likert scale framework since the study variables were based on the mean answers to the questionnaire items. This method is particularly appropriate for evaluating attitudinal constructs, especially when individual items differ in their relative importance. To account for these differences, each response option was assigned a corresponding weight, thereby ensuring that the significance of each questionnaire item was accurately reflected in the overall analysis. The interpretative ranges that were developed were Strongly Disagree (1.00–1.80), Disagree (1.81–2.26), Neutral (2.27–3.40), Agree (3.41–4.20), and Strongly Agree (4.21–5.00) in order to consider the ordinal-level Likert scale data as resembling ratio-level data. The figure (1) below illustrates study variables and the proposed estimated model.

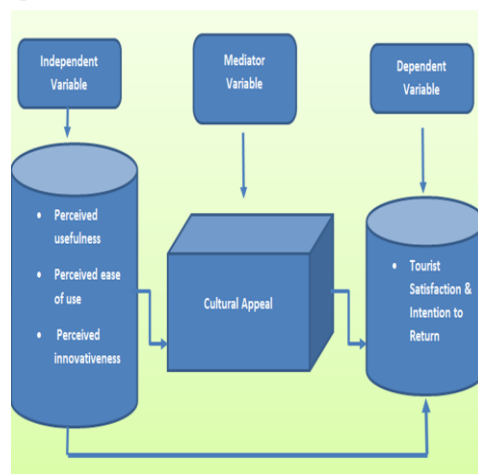


Figure 1: The structural model of the research variables.

this model illustrates the relationships between Technology Acceptance Model (TAM) dimensions – Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Perceived Innovativeness (PI)—as independent variables, Cultural Appeal (CA) as the mediating variable, and Tourist Satisfaction & Intention to Return (TSIR) as the dependent outcome. The model posits that tourists’ cognitive evaluations of AR/VR technologies influence their cultural perceptions, which in turn shape satisfaction and revisit intention within smart destination environments.

3.3.1. Independent Variables

- AR/VR destination experiences (X)
- Perceived Usefulness PU (X1)
- Perceived Ease of Use PEU(X2)
- Perceived Innovativeness PI (X3)

3.3.2. Mediator Variable

- Cultural Appeal CA (M)

3.3.3. Dependent Variable

- Tourist Satisfaction & Intention to Return TSIR (Y)

4. EMPIRICAL RESULTS

The researchers utilized the R statistical software package to conduct a comprehensive analysis of the collected data, with the objective of interpreting and examining the interrelationships among the study variables. The analytical procedure was executed in a systematic sequence as follows:

- Reliability Analysis: To evaluate the reliability and internal consistency of the items corresponding to each variable over the whole dataset, Cronbach's Alpha coefficient was utilized.
- Frequency Analysis: Frequency distributions were generated for each questionnaire item to explore the response patterns at both the individual statement and overall variable levels.
- Descriptive Statistics: Descriptive statistical measures were applied to each group of items and associated variables to evaluate the relative importance and central tendencies of responses.
- Hypothesis Testing: To evaluate the study's assumptions and find noteworthy patterns in the responses for every variable and item, a one-sample t-test was used.
- Correlation Analysis: The direction and strength of the linear correlations between

research variable pairs were evaluated using Pearson's correlation coefficient.

- Regression Analysis: Based on the independent and mediating factors, a linear regression model was built to see which model better explained the variation in the dependent variable.
- The study of causal links within the suggested conceptual framework was supported by the analysis of variance (ANOVA), which was used to assess the impact of independent and mediating factors on the dependent variable.

4.1. Reliability and Validity testing

To ensure the study instrument's resilience, validity and reliability tests were conducted prior to the use of complex statistical analyses. The purpose of these tests was to assess how well the questionnaire items captured the intended aspects in terms of correctness and consistency. The Cronbach's Alpha coefficient was used to evaluate the questionnaire's internal consistency across the three main study variables. This method is often used to evaluate the degree to which items on a scale measure the same underlying concept as a whole and are connected to one another. Perfect consistency is indicated by a Cronbach's Alpha score of 1, whereas zero indicates no internal consistency. Stronger reliability is shown by higher scores, which imply that the sample's responses are more likely to be typical of the wider population. This formula is used to get the Cronbach's Alpha coefficient:

$$\alpha = \frac{n}{n-1} \left[1 - \frac{\sum_{i=1}^n V_i}{V_t} \right]$$

The Cronbach Alpha and Validity coefficients are shown in table (2) below for each questionnaire item and variable named in the questionnaire.

Table 2: Cronbach Alpha coefficient and Validity coefficient for each item in the questionnaire.

| Statement | Cronbach's Alpha | Validity | Rank |
|-----------|------------------|----------|------------|
| S1 | 0.923 | 0.961 | Excellent |
| S2 | 0.712 | 0.844 | Acceptable |
| S3 | 0.845 | 0.919 | Good |
| S4 | 0.918 | 0.958 | Excellent |
| S5 | 0.814 | 0.902 | Good |
| S6 | 0.708 | 0.841 | Acceptable |
| S7 | 0.809 | 0.899 | Good |
| S8 | 0.864 | 0.930 | Good |
| S9 | 0.705 | 0.840 | Acceptable |
| S10 | 0.896 | 0.947 | Good |
| S11 | 0.915 | 0.957 | Excellent |
| S12 | 0.971 | 0.985 | Excellent |
| S13 | 0.825 | 0.908 | Good |

| | | | |
|-----|--------------|--------------|------------------|
| S14 | 0.715 | 0.846 | Acceptable |
| X | 0.924 | 0.961 | Excellent |
| S15 | 0.795 | 0.892 | Acceptable |
| S16 | 0.815 | 0.903 | Good |
| S17 | 0.902 | 0.950 | Excellent |
| S18 | 0.926 | 0.962 | Excellent |
| S19 | 0.943 | 0.971 | Excellent |
| M | 0.985 | 0.992 | Excellent |
| S20 | 0.892 | 0.944 | Good |
| S21 | 0.749 | 0.865 | Acceptable |
| S22 | 0.859 | 0.927 | Good |
| S23 | 0.904 | 0.951 | Excellent |
| S24 | 0.748 | 0.865 | Acceptable |
| S25 | 0.821 | 0.906 | Good |
| S26 | 0.892 | 0.944 | Good |
| S27 | 0.711 | 0.843 | Acceptable |
| S28 | 0.953 | 0.976 | Excellent |
| S29 | 0.958 | 0.979 | Excellent |
| S30 | 0.832 | 0.912 | Good |
| Y | 0.935 | 0.967 | Excellent |

The validity and Cronbach's Alpha coefficients had the lowest values, 0.840 and 0.705, respectively, as shown in Table (2). At a 95% confidence level, this provides statistical evidence of the dependability and validity of the collected data. Thus, statistical analysis and hypothesis testing will be conducted utilizing the gathered data set.

4.2 Statistical Analysis of the Data

Figure 2 explain the direct relation between ARVR expressed by its statements (from S1 to S14) and TSIR expressed by its statements (from S20 to S30) and the indirect relation between them through CA expressed by its statements (from S15 to S19).

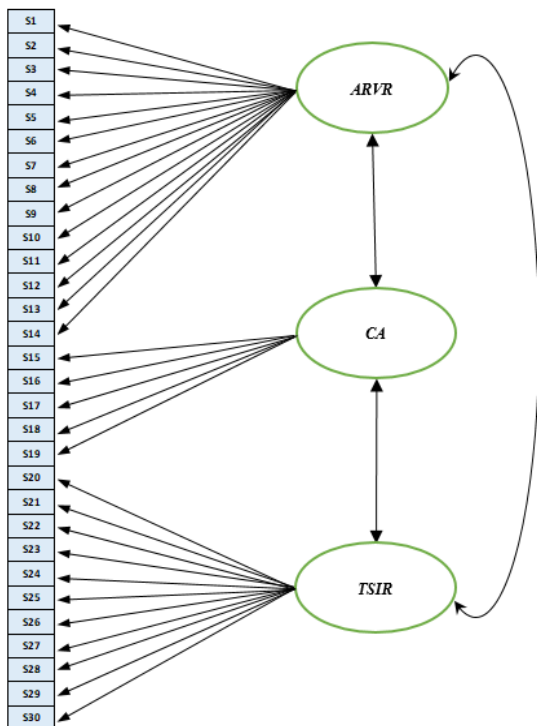


Figure 2: Path diagram of ARVR and TSIR through each mediator variable CA.

4.3. Tests and Measurement of Non-Parametric Statistics

To assess patterns in respondents' perceptions, a one-sample t-test was conducted to compare the mean response for each questionnaire item against a neutral reference value of 3. This statistical procedure is employed to determine whether the observed mean significantly deviates from the neutral point on the five-point Likert scale, thereby distinguishing meaningful trends from random variation. In the context of social science research, a p-value less than 0.05 is typically considered indicative of statistical significance. A statistically significant positive difference suggests a tendency among respondents to select favorable responses, such as "Agree" (4) or "Strongly Agree" (5). Conversely, a significant negative difference reflects a propensity toward disagreement, with selections such as "Disagree" (2) or "Strongly Disagree" (1). This analytical approach was employed to test the following hypotheses:

- Null Hypothesis (H₀): The neutral value of (3) is equal to the mean replies.
- Alternative Hypothesis (H₁): The mean answers deviate considerably from (3), which is the neutral value.
- This method enabled the researchers to identify statistically significant attitudes and opinions reflected in the survey data.

4.3.1 T-test of statements

The findings obtained by the researchers are displayed in Table (3) below, which groups the questionnaire questions based on the variables being studied.

Table 3: Results of t-test for each statement of the questionnaire.

| Statement | t-test value | P-value | Statement | t-test value | P-value |
|-----------|--------------|---------|-----------|--------------|---------|
| S1 | 44.25 | 0.003 | S16 | 36.46 | 0.006 |
| S2 | 40.14 | 0.009 | S17 | 38.72 | 0.012 |
| S3 | 38.67 | 0.006 | S18 | 33.95 | 0.009 |
| S4 | 29.71 | 0.005 | S19 | 32.68 | 0.008 |
| S5 | 39.63 | 0.004 | S20 | 39.76 | 0.007 |
| S6 | 32.62 | 0.022 | S21 | 44.78 | 0.025 |
| S7 | 30.57 | 0.034 | S22 | 37.17 | 0.025 |
| S8 | 42.3 | 0.006 | S23 | 39.47 | 0.009 |
| S9 | 44.41 | 0.045 | S24 | 34.61 | 0.048 |
| S10 | 41.52 | 0.008 | S25 | 33.31 | 0.011 |
| S11 | 38.28 | 0.004 | S26 | 40.53 | 0.007 |
| S12 | 45.17 | 0.001 | S27 | 45.65 | 0.004 |

| | | | | | |
|-----|-------|-------|-----|-------|-------|
| S13 | 38.28 | 0.002 | S28 | 37.89 | 0.013 |
| S14 | 40.22 | 0.008 | S29 | 40.24 | 0.011 |
| S15 | 42.62 | 0.042 | S30 | 35.28 | 0.045 |

The p-values obtained from the one-sample t-test for each item in the questionnaire were found to be below the conventional 5% significance level, as shown in the table above (Table 3). This finding provides sufficient statistical evidence to rule out the null hypothesis in each case. The results provide strong evidence that the mean responses have a noticeable tilt toward the positive end of the Likert scale and are substantially different from the neutral middle at the 95% confidence level. In particular, respondents generally have a propensity to express agreement with the questionnaire items, as indicated by the direction and size of the t-test data. Given that participants consistently fall into the "Agree" and "Strongly Agree" response groups, it may be inferred that they generally have a positive mind-set.

4.3.2 T-test of study variables

The trend of respondents in the population for each research variable was examined using the t-test.

Table 5: Correlation Coefficient among dependent, independent and Mediator variable.

| Variables | | X | M | Y |
|--|------------|--------|--------|--------|
| AR/VR destination experiences (X). | R | | 89.50% | 87.30 |
| | Sig. Value | | 0.001 | 0.000 |
| Cultural Appeal (M) | R | 89.50% | | 85.40% |
| | Sig. Value | 0.001 | | 0.000 |
| Tourist Satisfaction & Intention to Return (Y) | R | 87.30% | 85.40 | |
| | Sig. Value | 0.000 | 0.000 | |

From Table (5): At the 95% confidence level, there is statistical evidence of a strong and positive relationship between AR/VR destination experiences (X) and Tourist Satisfaction & Intention to Return (Y) because the p-values for both the independent and dependent variables are below the 5% significance level.

In a similar vein, the p-value for both the independent and mediator variables is below the 5% significance level, suggesting a 95% confidence level for a statistically significant and positive relationship between the independent variable (X), AR/VR destination experiences and the mediator (M). At the 95% confidence level, there is statistical evidence of a significant and positive link between the dependent and mediator variables, since the p-values for both are below the 5% significance level as shown in figure (3).

These findings are shown in the following table (4)

Table 4: T-test for study variables.

| Variables | t-test value | P-value |
|--|--------------|---------|
| AR/VR destination experiences (X) | 42.35 | 0.004 |
| Cultural Appeal (M) | 41.57 | 0.001 |
| Tourist Satisfaction & Intention to Return (Y) | 43.71 | 0.000 |

Table (4) makes it clear that, for every variable in the investigation, the null hypothesis can be rejected at the 95% confidence level. This result confirms that respondents generally agree or strongly agree with the claims made in the survey.

4.4 Test of hypothesis

To test the hypothesis, the researcher analyzed the Pearson's correlation coefficient among the study variables, and the researcher reached the following results:

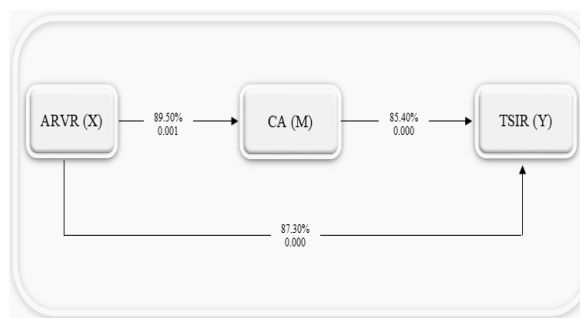


Figure 3: Structural Model Showing the Relationships Among Variables.

4.5. Testing mediation with regression analysis

A mediation model states that the relationship between an independent variable (X) and a dependent variable (Y) is mediated by a mediator variable (M). This theory states that the independent variable (X) impacts the mediator, and the mediator

(M) effects the dependent variable (Y). The model additionally accounts for the direct impact of the independent variable (X) on the dependent variable (Y), in addition to the indirect influence mediated by (M). One well-liked method for testing mediation is the one put out by Baron and Kenny (1986). In a mediation research, the direct, indirect, and total effects are all of interest. However, the primary hypothesis to be examined is whether the indirect influence, (ab), is statistically significant. As demonstrated by MacKinnon, this may be done using the Large Sample Wald Test. The Wald test may be created to ascertain whether ab equals zero (first-order standard error of Sobel).

$$z = \frac{ab}{\sqrt{(a s_b)^2 + (b s_a)^2}}$$

In 1993, Efron and Tibshirani introduced bootstrapping, a resampling technique used to estimate standard errors and generate confidence intervals when traditional parametric assumptions are not met. Using bootstrap sampling, many (B) estimates of the indirect impact (ab) are generated. Statistical inference may be performed using a Wald-type z-test since the standard deviation of these bootstrap estimates is close to the standard error for the indirect effect (ab).

Our model can be represented in the following figure (4).

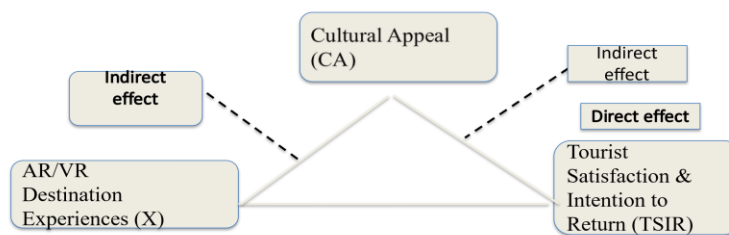


Figure 4: Mediation model illustrating the direct and indirect effects of Augmented and Virtual Reality (ARVR) on Tourist Satisfaction and Intention to Return (TSIR) through Cultural Appeal (CA).

Using this model, the researcher aims to ascertain how the independent variable (X) affects the dependent variable (Y), both directly and indirectly. If the absolute effects of (X) on (Y) change in size and have a significant indirect influence on (Y) through the usage of the mediator variable (M), this indicates that (M) was a mediator; it bypasses the effect of (X) on (Y). In contrast, the direct impact should lessen when (X) and (Y) have a large direct influence even when (M) is included in the equation because some of the impact is distributed across the mediator.

In the case when the direct effect is declined but still significant, this is understood as evidencing partial mediation. Conversely, when the direct effect loses statistical significance when the mediator is held constant, it is known as a complete mediation.

The regression models containing mediator variable shall be subjected to an ANOVA in the

following section. This discussion will assess the importance of each model. Moreover, the Sydney Patterson will be utilized to analyze the magnitude and significance of the direct and indirect impacts of the mediator. Direct, Indirect, and Total Effects per model will also be presented. The ANOVA table (6) results of each estimated regression model are summarized as follows.

Table 6: Summary of Analysis of variance of regression models for mediator variable.

| Models | Dependent Variable | Independent variables | R ² | Sig. |
|---------------------------------|--------------------|-----------------------|----------------|--------|
| Model 1: Y = f(X ₁) | TSIR (Y) | PU (X ₁) | 72.50 % | 0.00 2 |
| Model 2: Y = f(X ₂) | TSIR (Y) | PEU (X ₂) | 79.20 % | 0.00 0 |
| Model 3: Y = f(X ₃) | TSIR (Y) | PI (X ₃) | 80.20 % | 0.00 1 |
| Model 4: Y = f(M) | TSIR (Y) | CA (M) | 72.93 % | 0.00 0 |

| | | | | |
|----------------------|----------|----------|---------|--------|
| Model 5 : Y = f(X) | TSIR (Y) | ARVA (X) | 76.21 % | 0.00 0 |
| Model 6 : M = f(X) | CA (M) | ARVA (X) | 80.10 % | 0.00 1 |
| Model 7: Y = f(X, M) | TSIR (Y) | ARVR (X) | 11.02 % | 0.00 3 |
| | | CA (M) | 76.47 % | 0.00 0 |

From Table (6); the researcher has reached the following results:

- Model 1: At the 95% confidence level, statistical evidence demonstrates that the independent variable (PU) (X₁) significantly influences the dependent variable (TSIR) (Y). The model yielded a coefficient of determination (R²) of 72.50%, with a significance (Sig.) value below the 5% threshold, indicating a strong and statistically significant relationship.
- Model 2: The results indicate that the independent variable (PEU) (X₂) has a statistically significant effect on TSIR (Y), with a coefficient of determination of 79.20% and a Sig. value below 5%, confirming the model's significance at the 95% confidence level.
- Model 3: Statistical evidence at the 95% confidence level reveals that the independent variable (PI) (X₃) significantly affects TSIR (Y). A strong and statistically significant association was supported by the model's R² value of 80.20% and Sig. value, which was less than 5%.
- Model 4: A 95% confidence level reveals a significant relationship between the mediator variable (CA) (M) and TSIR (Y), with a coefficient of determination of 72.93% and a Sig. value below 5%.
- Model 5: With an R² value of 76.21% and a Sig. value less than 5%, the independent variable (ARVR) (X) has a statistically significant impact on TSIR (Y). This corroborates the finding that, at the 95% confidence level, ARVR significantly aids in TSIR prediction.
- Model 6: At the 95% confidence level, there is a strong predictive relationship between the independent variable ARVR (X) and the mediator variable CA (M), as evidenced by the coefficient of determination of 80.10% and a Sig. value below 5%.
- Model 7: This model evaluates the joint impact of the mediator CA (M) and ARVR (X) on the dependent variable TSIR (Y). Both predictors

remain statistically significant, with Sig. values of 0.003 and 0.000, respectively—each below the 5% threshold. The coefficient of determination attributed to ARVR is 11.02%, while CA accounts for 76.47%. These findings suggest that CA has a direct and substantial impact on TSIR (Y), supporting its role as a mediator in the model.

Using the Bootstrap technique, the following table (7) displays the mediator variable's Total Effect, Direct Effect, and Indirect Effect.

Table 7: Direct, Indirect, and Total Effects using Bootstrap.

| Type of Effect | Coefficient | SE | H0: β _(i) =0 | Sig. value | LL of β _(i) | UL of β _(i) |
|----------------------|-------------|-------|-------------------------|------------|------------------------|------------------------|
| Total | 1.412 | 0.023 | 44.345 | 0.000 | 1.015 | 1.614 |
| Direct (X → Y) | 1.027 | 0.072 | 7.021 | 0.000 | 0.795 | 1.284 |
| Indirect (X → M → Y) | 0.385 | 0.452 | 1.209 | 0.001 | 0.279 | 0.594 |

The researcher's conclusions from Table (7) are as follows:

At a 95% confidence level, there is statistical evidence that the mediator variable influences the dependent variable. The models' regression equations may be concluded as follows.

$$TSIR = 0.071 + 1.525 PU$$

(R²=72.50%) (0.000) (0.002)

$$TSIR = 0.046 + 1.124 PEU$$

(R²=79.20%) (0.027) (0.000)

$$TSIR = 0.042 + 1.052 PI$$

(R²=80.20%) (0.005) (0.001)

$$TSIR = 0.064 + 1.101 CA$$

(R²=72.93%) (0.004) (0.000)

$$TSIR = 0.012 + 1.412 ARVR$$

(R²=76.21%) (0.037) (0.000)

$$CA = 0.061 + 1.054 ARVR$$

(R²=80.10%) (0.002) (0.001)

$$TSIR = 0.015 + 0.806 CA + 0.649 ARVR$$

(R²=87.49%) (0.036) (0.003) (0.000)

4.6. Findings and test of hypothesis

According to the previous statistical analysis and the study hypotheses, the researcher found that all hypothesis has been accepted as shown in table (8).

Table 8: Conclusion of research Hypotheses.

| No. Hypothesis | Decision |
|----------------|----------|
| H ₁ | Accept |
| H ₂ | Accept |
| H ₃ | Accept |
| H ₄ | Accept |
| H ₅ | Accept |
| H ₆ | Accept |

4.6. Discussion

The following discussion interprets the empirical findings in light of the theoretical framework and prior research

this research explored how immersive technologies—specifically augmented reality (AR) and virtual reality (VR)—shape tourists' evaluative and behavioral responses in NEOM, a pioneering smart destination in Saudi Arabia. The study aimed to understand not only the direct influence of AR/VR on Tourist Satisfaction and Intention to Return (TSIR) but also the mechanism through which Cultural Appeal (CA) enhances or transmits these effects. With data collected from 390 visitors, the results provide significant empirical evidence supporting the proposed conceptual framework.

The analysis demonstrated that tourists' perceptions of AR/VR usefulness, ease of use, and innovativeness are strongly associated with their satisfaction and likelihood of revisiting the destination. These findings align with the core assumptions of the Technology Acceptance Model (TAM), suggesting that tourists rely on cognitive judgments to evaluate the value of immersive tools. Among the predictors, Perceived Innovativeness (PI) was the most influential driver, emphasizing the role of novelty-seeking tendencies in shaping positive attitudes toward immersive experiences. This indicates that tourists are particularly responsive to AR/VR features that offer originality and creativity, reinforcing the experiential dimension of technology adoption highlighted in prior research.

A key contribution of this study is the empirical validation of Cultural Appeal (CA) as both a significant standalone predictor and as a mediating construct. CA accounted for a substantial portion of the variance in TSIR, suggesting that cultural relevance deepens tourists' engagement and enhances the emotional significance of immersive encounters. The mediation results, supported by bootstrapping, revealed that AR/VR technologies indirectly influence tourists through their effect on CA, while a direct effect remains present. This pattern reflects partial mediation, implying that

immersive technologies exert their influence through both technological attributes and cultural resonance. These findings expand on existing virtual tourism literature, underscoring the importance of embedding cultural narratives and symbolism into digital experiences.

The demographic pattern—where a majority of participants were first-time visitors—further underscores NEOM's strategic advantage in utilizing AR/VR to craft memorable initial impressions. For emerging destinations, immersive technologies function as tools for orientation, interpretation, and cultural communication, helping visitors form attachments that influence long-term destination loyalty. AR/VR can therefore act as strategic instruments that introduce cultural identity in an engaging, accessible, and visually enriched format.

Overall, the results extend theoretical perspectives by illustrating that the value of immersive technologies cannot be fully understood without considering cultural contextualization. By demonstrating that CA acts as a psychological bridge between AR/VR features and tourist outcomes, this study integrates cultural theories with technology acceptance frameworks and destination experience models. This multidimensional approach enriches existing scholarship and highlights new avenues for designing culturally grounded digital tourism experiences in smart destinations such as NEOM.

Drawing on the above discussion, the following section presents the Theoretical Contributions.

4.7. Theoretical Contributions

This study offers several important theoretical contributions to the literature on immersive technologies and tourism behavior. First, it extends the Technology Acceptance Model (TAM) by demonstrating that tourists' evaluations of AR/VR technologies in smart destinations are not solely based on perceptions of usefulness and ease of use. The inclusion of Perceived Innovativeness (PI) highlights the importance of hedonic and experiential components, suggesting that immersive technologies shape attitudes through cognitive as well as affective pathways. This enriches TAM by integrating experiential technology attributes into the model.

Second, the study advances the understanding of Cultural Appeal (CA) as a mediating psychological mechanism that strengthens the influence of AR/VR on tourist outcomes. By positioning CA not merely as a contextual variable but as a dynamic construct that channels the effect of technology on behavior, the research introduces a novel dimension to virtual

tourism theories. This conceptualization demonstrates how cultural meaning embedded in digital content enhances immersion, emotional engagement, and satisfaction.

Third, the findings contribute to destination experience literature by illustrating how immersive technologies can support emerging destinations such as NEOM in establishing cultural identity and shaping early-stage tourist perceptions. The integration of AR/VR into cultural storytelling offers a theoretical bridge between digital transformation and cultural tourism, highlighting the potential for technology-mediated authenticity.

Finally, the study provides empirical evidence confirming partial mediation, offering a refined understanding of how immersive technologies influence behavioral intentions. By using both regression and bootstrapping methods, the research strengthens analytic rigor in examining mediation effects within tourism settings

Drawing on the above Theoretical Contributions, the following section presents the Practical Implications

7. Practical Implications

the findings present several practical implications for tourism developers, policymakers, and experience designers. For emerging destinations like NEOM, AR/VR technologies can serve as transformative tools to enhance visitor engagement and build destination loyalty. Since Perceived Innovativeness emerged as the strongest predictor of satisfaction, developers should prioritize AR/VR features that deliver unique, emotionally rich, and visually stimulating experiences rather than focusing solely on informational content.

The strong role of Cultural Appeal suggests that immersive experiences must incorporate authentic cultural elements to maximize their impact. Tourism authorities could use AR/VR to interpret heritage, local traditions, and cultural narratives in ways that appeal to international audiences while preserving cultural integrity. This approach can strengthen NEOM's competitive identity as a culturally grounded yet technologically advanced destination.

For hospitality providers, integrating AR/VR applications into hotels, visitor centers, and attractions can enrich the pre-visit and on-site experience. Such tools can guide tourists, provide immersive previews, and support learning about the destination's cultural landscape. Moreover, AR/VR solutions can aid in managing visitor flows, enhancing accessibility, and promoting sustainable tourism practices.

Policymakers may consider investing in digital

infrastructure to support large-scale deployment of immersive technologies. Training programs for tourism staff on how to operate and customize AR/VR applications can further enhance the quality of service and improve visitor satisfaction

From a sustainability perspective, immersive technologies such as AR and VR provide destinations with innovative tools to communicate cultural narratives while minimizing the environmental and physical pressures associated with intensive tourism flows

The findings suggest that integrating immersive technologies into destination strategies can support sustainable tourism planning by enhancing cultural engagement and strengthening tourists' emotional connection without relying solely on physical visitation.

consequently, this study highlights the potential of digitally mediated experiences to contribute to long-term destination resilience and sustainable competitiveness within emerging smart tourism ecosystems.

Building on the practical implications discussed above, the following section summarizes the main conclusions of the study.

5. CONCLUSIONS

This study demonstrates that immersive technologies—specifically AR and VR—play a significant role in shaping tourist satisfaction and intention to return, especially within smart destinations such as NEOM. The findings confirm that tourists' perceptions of usefulness, ease of use, and innovativeness significantly influence their overall experience. Cultural Appeal emerged as a critical element that not only enhances satisfaction directly but also mediates the influence of AR/VR on behavioral intentions.

By integrating technological and cultural determinants, this research presents a comprehensive model that contributes to both theory and practice. It shows that immersive technologies gain their full impact when they deliver culturally meaningful and innovative content. The study reinforces the importance of using AR/VR to communicate identity, immerse visitors emotionally, and foster long-term loyalty. As NEOM continues to evolve, immersive experiences may play a central role in shaping how future tourists perceive and connect with the destination.

Overall, this study emphasizes that immersive digital technologies can play a strategic role in shaping sustainable, culturally meaningful, and future-oriented tourism experiences, offering valuable

directions for both researchers and destination planners seeking to balance technological innovation with long-term sustainable development

Based on the overall findings and conclusions, the following recommendations are proposed for practitioners and stakeholders.

5.1. Recommendations

Based on the empirical findings of this study, several recommendations are proposed to enhance the effectiveness of immersive technologies and strengthen the overall tourism experience in NEOM and similar smart destinations.

1. Enhance the Cultural Integration of AR/VR Content

Given the strong mediating role of Cultural Appeal (CA), destination managers should prioritize embedding authentic cultural elements—such as local heritage, narratives, traditions, and symbolic visuals—into AR/VR applications. This cultural enrichment can deepen emotional engagement and increase satisfaction and loyalty among visitors

2. Invest in High-Quality, Innovative Immersive Experiences

As Perceived Innovativeness (PI) emerged as the strongest predictor of satisfaction, tourism developers should focus on delivering AR/VR features that are creative, interactive, and technologically advanced. Regular updates to AR/VR platforms can help maintain a sense of novelty for repeat visitors and strengthen destination competitiveness

3. Improve Accessibility and Ease of Use of AR/VR Tools

Since perceived ease of use significantly influences tourist satisfaction, AR/VR interfaces should be intuitive and user-friendly. Providing multilingual options, clear navigation tools, and guided instructions will ensure that diverse visitors can fully benefit from immersive experiences.

4. Strengthen Collaboration Between Cultural Institutions and Technology Providers

To maximize the value of immersive tourism applications, closer partnerships between museum curators, cultural experts, and AR/VR developers are recommended. Such collaborations will help ensure that digital content is both culturally accurate and technologically sophisticated.

5. Utilize AR/VR in Visitor Orientation and Pre-Visit Engagement

NEOM can leverage immersive technologies to introduce visitors to the destination before arrival. Virtual previews, cultural walk-throughs, and interactive destination simulations can help build

expectations and foster early attachment, especially for first-time tourists.

6. Expand the Use of AR/VR Across Hotels, Attractions, and Visitor Centers

Tourism organizations should integrate immersive tools at key touchpoints such as airports, hotels, parks, and heritage sites. This will create a seamless experiential journey that reinforces satisfaction at multiple stages of the tourist lifecycle.

7. Encourage Sustainable Tourism Through Immersive Technologies

AR/VR can play an important role in environmental and cultural conservation. Virtual access to fragile heritage zones can reduce physical impact, while immersive storytelling can raise awareness about sustainability practices among tourists.

8. Conduct Continuous Evaluation of AR/VR Experiences

Tourism organizations should implement monitoring systems to regularly assess visitor satisfaction with AR/VR applications. User feedback, system analytics, and cultural relevance audits will help identify improvement opportunities and maintain high-quality immersive offerings

Despite the practical relevance of these recommendations, several limitations should be acknowledged, which also provide directions for future research

5.2. Limitations and Future Research

This study contributes to existing knowledge by examining the mediating role of cultural appeal in explaining how immersive technologies, namely Augmented Reality (AR) and Virtual Reality (VR), influence tourist satisfaction and intention to revisit destinations. However, several limitations should be acknowledged. First, the study focuses specifically on the tourism sector, which may limit the applicability of the findings to other important sectors in Saudi Arabia, such as hospitality services, retail, or digital commerce. Second, the study adopts a cross-sectional research design, where data were collected at a single point in time. This approach limits the ability to infer causal relationships between AR/VR experiences, cultural appeal, and tourist behavioral outcomes. Future studies could employ longitudinal designs to better capture how tourists' perceptions and experiences evolve over time with repeated exposure to immersive technologies. In addition, future research may examine the long-term effects of AR and VR experiences on tourist satisfaction and loyalty. Comparative studies across different cultural or technological contexts are also

encouraged to assess the generalizability of the proposed framework and explore potential cross-cultural differences in the perception of immersive tourism experiences. Addressing these limitations

may further enhance understanding of immersive technologies and their role in shaping sustainable tourism experiences.

Data Availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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

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