



ISSN: 2723-9535

Available online at www.HighTechJournal.org

HighTech and Innovation Journal

Vol. 6, No. 3, September, 2025



Virtual Reality Tourism: Connecting Immersive Experiences to Future Travel Choices

Lei Zhou ^{1, 2}, Huaqing Zhou ³, Xiaotang Cui ⁴, Jing Zhao ^{5, 6*}

¹ School of Art and Design, Henan University of Engineering, Henan 451191, China.

² College of Landscape Architecture and Art, Henan Agricultural University, Henan 450002, China.

³ School of Culture and Communication, Zhejiang Wanli University, Zhejiang 315100, China.

⁴ School of Art and Design, Zhengzhou University of Light Industry, Henan 450002, China.

⁵ College of Landscape Architecture Art, Henan Agricultural University, Henan 450002, China.

⁶ Faculty of Humanities and Social Sciences, City University of Macau, Macau SAR, 999078, China.

Received 17 April 2025; Revised 21 August 2025; Accepted 28 August 2025; Published 01 September 2025

Abstract

This empirical investigation examines the transformative impact of Virtual Reality (VR) implementations on destination accessibility within China's tourism sector. The research examines the interrelated relationships between VR Experience (VREX) determinants, experiential outcomes, and subsequent Visiting Intention (VIS). The theoretical framework encompasses three fundamental VREX antecedents: Telepresence (TLP), VR Application Quality (VAQ), and Perceived Realism (PREA). This research analyzes the impact of VREX on Perceived Enjoyment (PE) and Perceived Advantage (PAD), and in turn, their impact on VIS. Through purposive sampling methodology, the study gathered responses from 307 individuals actively engaging with VR tourism applications across China. Statistical analysis revealed significant associations between VREX and VIS, with all three antecedents demonstrating substantial influence on VREX formation. The findings establish that VREX has a significant impact on both PE and PAD dimensions. Notably, while PE emerged as a significant determinant of VIS, PAD demonstrated no substantial effect on visit intentions. This investigation advances theoretical discourse in virtual tourism by illuminating the crucial role of immersive technological experiences in destination marketing. For practitioners, these findings suggest prioritizing enjoyment-focused VR designs and investing in technologies that enhance telepresence and realism to influence potential tourists' visit intentions effectively.

Keywords: Virtual Reality Experience; Telepresence; Virtual Reality Application Quality; Perceived Realism; Perceived Enjoyment; Perceived Advantages; Visiting Destination Intention.

1. Introduction

The twenty-first century has ushered in an unprecedented era of technological transformation, marked by revolutionary advances in digital infrastructure and computing capabilities [1]. At the forefront of this digital revolution stands Virtual Reality (VR) technology, which has fundamentally redefined human-computer interaction paradigms through its immersive capabilities [2]. The convergence of hardware miniaturization, enhanced processing power, and

* Corresponding author: ling.ting0408@163.com

<http://dx.doi.org/10.28991/HIJ-2025-06-03-06>

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sophisticated image processing has catalyzed the development of VR systems that transcend traditional digital experiences, particularly in the tourism sector [3]. VR technology has emerged as a transformative force in destination marketing and exploration, offering immersive 360-degree experiences that enable potential tourists to forge profound psychological connections with destinations before physical visits [4]. This technological innovation serves multiple crucial functions: it provides comprehensive virtual previews that bridge the gap between anticipation and reality, enhances decision-making confidence, and democratizes travel experiences for individuals facing mobility, financial, or geographical constraints [5]. In the context of Chinese tourism, VR technology has become an instrumental tool for showcasing the nation's diverse cultural heritage sites, remote landscapes, and unique destinations to global audiences [6, 7]. Its capacity to simulate restricted-access locations safely while maintaining site preservation has particular relevance for adventure tourism operators and cultural site managers.

The integration of VR with emerging innovations in artificial intelligence and automation has created a paradigm shift in destination marketing and accessibility, offering cost-effective, sustainable solutions for promotion while serving educational and cultural preservation purposes [2]. This VR experience (VREX) advancement has demonstrated measurable success in influencing visiting destination intentions (VIS) [8]. The implementation of VR in tourism infrastructure represents a revolutionary approach to destination marketing and accessibility, particularly in the context of China's diverse and sometimes challenging-to-access tourist locations, marking a new frontier in how potential visitors explore, experience, and connect with destinations [9]. Hence, this study aims to explore the relationship between VREX and VIS.

The efficacy of VREX in tourism contexts emerges from the interplay of three fundamental components: the psychological dimension of telepresence (TLP) [10], the technical dimension of virtual reality application quality (VAQ) [11], and the experiential dimension of perceived realism (PREA) [12]. These interconnected elements form the cornerstone of successful virtual tourism implementations, particularly in showcasing specialized tourist destinations [13]. The concept of TLP manifests as users' psychological transportation into the virtual environment, creating an immersive sensation that simulates physical presence at the destination [14]. This psychological engagement mechanism proves especially valuable when presenting remote or restricted Chinese tourist locations to potential visitors. The VAQ of VR applications, encompassing high-resolution visual rendering, intuitive interaction design, and responsive system performance, establishes the technological foundation necessary for delivering compelling virtual experiences [8, 15]. Furthermore, the PREA of virtual environments serves as a critical bridge connecting digital representations with physical reality, enabling visitors to form meaningful connections with destinations through virtual encounters [16, 17]. The synergistic interaction among these three components creates a comprehensive framework that enhances the accessibility and appeal of distinctive tourist destinations through virtual means. Hence, this research aims to explore the associations of VREX antecedents with VREX.

The impact of VREX in tourism manifests through two distinct but interconnected outcome variables: Perceived Enjoyment (PE) [18] and Perceived Advantage (PAD) [8], which collectively shape users' responses to VIS. These outcomes reflect both the experiential and pragmatic dimensions of virtual tourism engagement, particularly relevant when exploring specialized tourist locations. The PE dimension encompasses the inherent psychological gratification users derive from VREX [19]. In the context of virtual tourism, this PE becomes especially pronounced when users interact with immersive representations of culturally significant or geographically remote destinations, engaging in a risk-free digital exploration of these environments [20]. Concurrently, PAD represents the practical and strategic benefits users identify in virtual tourism platforms [21]. The interrelationship between VREX and these outcome variables plays a pivotal role in shaping users' attitudes toward virtual tourism platforms and their subsequent intentions regarding both digital and physical destination visits [8, 22]. Hence, the current investigation aims to explore the associations of VREX with PE and PAD.

The transition from virtual engagement to physical visitation represents a crucial nexus in understanding the strategic value of VR tourism implementations, particularly in the context of specialized destination marketing. This pathway illuminates how immersive digital experiences influence tourism decision-making processes and VIS. Contemporary research indicates that the affective pathway emerges when virtual encounters create compelling PE with destinations, fostering psychological connections that shape VIS [23]. This emotional engagement proves especially relevant for unique tourist locations that benefit from preliminary virtual exposure to their distinctive characteristics [24]. Additionally, the cognitive pathway develops through users' PAD, including enhanced spatial comprehension, cultural familiarity, and reduced travel planning uncertainty [8, 25]. The hypothesized significant influence of PAD on VIS finds support in both theoretical foundations and the specific context of VR tourism. Although PAD's effects demonstrate context dependency, multiple factors substantiate this hypothesis. Primarily, within VR tourism, PAD encompasses the practical benefits perceived by users in utilizing VR for destination preview, including enhanced decision-making capabilities and reduced destination uncertainty. VR technology, distinct from traditional tourism information channels, offers distinctive advantages through immersive visualization and spatial presence, which theoretically exert more direct influence on visiting intentions [25]. This relationship holds particular relevance in the Chinese tourism market, where pre-visit information gathering serves as a critical component of decision-making. Additionally, the high-involvement nature of tourism decisions indicates that PAD of VR previews maintains a crucial role in behavioral intention formation,

as corroborated by technology adoption theories in high-stakes decision contexts. These dual mechanisms—PE and PAD—constitute fundamental elements in understanding how VR technology bridges the divide between digital exploration and VIS. This study aims to examine the transformation of PE and PAD into VIS, investigating how these experiential outcomes catalyze concrete tourism behaviors.

The theoretical framework of this research is built upon VREX as the independent variable, influenced by three critical elements: TLP, VAQ, and PREA. Within this framework, PE and PAD function as mediating variables between VR Experience and behavioral outcomes. PE encompasses the hedonic dimensions of VR tourism interaction, manifesting through user pleasure and entertainment. PAD reflects the comparative benefits of VR against traditional tourism information channels. These mediating constructs hold theoretical significance in elucidating the mechanisms through which VREX affects the dependent variable, VIS. The theoretical structure enhances the understanding of VR tourism adoption by delineating how VREX, shaped by technical and psychological elements, influences tourism intentions through hedonic (PE) and utilitarian (PAD) pathways. This dual-mediation approach offers a comprehensive explanation of the role of VR technology in tourism decision-making processes.

This empirical research advances the theoretical literature of VR in tourism through a detailed research framework based on trending VR variables and their interconnected relationships. This research covers the following research gaps. It assesses the impacts of TLP, VAQ, and PREA on VREX. Furthermore, it analyzes the impact of VREX on VIS, PE, and PAD. Lastly, it measures the impacts of PE and PAD on VIS. Tourism industry stakeholders, including tourism managers, practitioners, and policymakers, gain substantial insights from this empirical investigation regarding the significant methodology of virtual reality implementation in their respective areas.

The expanding role of VR in tourism marketing highlights substantial theoretical and contextual gaps in contemporary literature regarding the influence of VR on tourist behavior. Although existing research has investigated independent concepts of VR tourism experiences, the field lacks comprehensive theoretical frameworks that effectively capture the intricate relationships between VR experience determinants and tourist decision-making. The extant literature predominantly emphasizes singular constructs, such as technology acceptance or user experience, without establishing an encompassing framework that integrates the technical, experiential, and behavioral dimensions of VR tourism. The Chinese tourism context presents a notable research opportunity, given the limited empirical investigations despite China's leadership in digital innovation and the adoption of VR technology. The distinct patterns of technology utilization and decision-making processes among Chinese tourists warrant specific examination. Although VR tourism applications have experienced rapid growth in the Chinese market, the validation of theoretical frameworks within this unique cultural and technological environment remains inadequate. This knowledge gap holds particular significance, considering China's extensive tourism market and its distinctive digital landscape [6, 7]. The present research addresses these limitations through an integrated model incorporating technical antecedents, experiential outcomes, and behavioral intentions, supported by empirical evidence from the Chinese tourism sector. This framework provides deeper insights into the influence of VR on tourist decision-making within one of the world's leading tourism markets.

Following this introduction, Section 2 presents the theoretical background, reviewing relevant literature on the adoption of VR technology in tourism contexts and developing the research hypotheses. Section 3 details the methodological approach, including measurement development, data collection procedures, and analytical strategies. Section 4 presents the empirical findings, encompassing both measurement model validation and structural model testing results. Section 5 discusses the theoretical and practical implications of the findings, contextualizing them within existing literature. Section 6 concludes the study by summarizing key contributions, acknowledging limitations, and suggesting future research directions. Finally, the study's conclusion is presented in Section 7.

2. Literature Review and Hypothesis Development

2.1. VR Experience and Visiting Destination Intention

Virtual Reality has emerged as a transformative technology that merges virtual and physical realms to create immersive three-dimensional experiences [2]. The evolution of VR technology in tourism has progressed through distinct phases, from basic simulations to sophisticated interactive environments, garnering significant attention within the tourism sector [9]. When implemented in tourism contexts, VREX enables potential visitors to engage with destinations through multi-sensory virtual encounters [2].

The digital transformation of tourism marketing has positioned VREX as a crucial factor influencing VIS. Studies demonstrate that immersive VREX has a significant impact on tourists' behavioral intentions [8]. When tourists engage with VR travel content, they experience altered perceptions of presence and time, resulting in increased destination engagement. Research confirms that VREX creates profound immersive states that positively influence tourists' intentions to visit destinations they have virtually experienced [6]. Further research emphasizes that positive experiential factors have a significant influence on tourists' destination choices [5]. This understanding provides a theoretical foundation for examining the relationship between virtual experiences and actual visit intentions.

H1. VREX significantly influences VIS.

2.2. Antecedents of VR Experience

Virtual environments create distinct psychological states through TLP, which fundamentally shapes how users process and respond to digital experiences [10]. Research has demonstrated that TLP significantly influences user engagement and behavioral responses in virtual settings, with higher levels of presence correlating to enhanced VREX [13]. Studies in immersive technologies have consistently shown that when users experience strong TLP, they demonstrate enhanced information retention and more positive attitudinal responses toward the presented content [14, 26], suggesting a direct relationship between TLP and experiential outcomes.

VAQ represents a critical technical foundation that determines the effectiveness of VREX [8]. Recent empirical studies have established that high VAQ, characterized by smooth interaction mechanics and visual fidelity, significantly enhances user immersion and engagement [11]. This relationship has been validated across multiple contexts, with research demonstrating that superior VAQ leads to increased user satisfaction and stronger behavioral intentions [27], indicating a significant association between VAQ and VREX.

The role of PREA in virtual environments has emerged as a crucial factor in determining the effectiveness of VREX [12]. Studies have consistently demonstrated that when users perceive virtual environments as authentic and realistic, they exhibit higher levels of engagement and stronger emotional responses [28]. This relationship is particularly evident in immersive learning contexts, where higher PREA correlates with improved learning outcomes and stronger behavioral intentions [17, 29]. Therefore, it can be indicated that PREA has a fundamental role in VREX effectiveness. Hence, the following is postulated.

H2. TLP significantly influences VREX.

H3. VAQ significantly influences VREX.

H4. PREA significantly influences VREX.

2.3. VR Experience and Perceived Enjoyment

The concept of perceived enjoyment was initially defined as the extent to which the use of technology is considered inherently pleasurable, independent of any performance-related outcomes [19]. In the context of immersive technologies, it is worth emphasizing that virtual reality applications contribute to enhanced consumer experiences through the inherent enjoyment derived from VR engagement [8]. This enjoyment factor is closely tied to the sense of immersion, which is conceptualized as the degree to which users feel psychologically present in the virtual environment [18].

Research has consistently demonstrated that immersive experiences facilitated through VREX significantly enhance PE [20]. The unique advantage of VREX lies in its ability to deliver engaging content without the typical constraints associated with physical tourism, such as overcrowding or environmental disturbances [30]. Empirical evidence further substantiates the positive relationship between VREX and PE, demonstrating that immersive VREX interactions lead to enhanced PE levels among users [19, 31]. Hence, the following is postulated.

H5. VREX significantly influences PE.

2.4. VR Experience and Perceived Advantage

The multifaceted nature of VREX has been well-documented in the literature. Research revealed that these dimensions significantly influenced PAD among visitors [8]. Building on this foundation, it can be demonstrated that virtual tourism experiences generate both utilitarian and hedonic benefits through different experiential mechanisms. The concept of PAD, which is often used interchangeably with perceived benefits, represents the specific positive outcomes that individuals anticipate from their experiences [22]. In the context of heritage tourism, virtual experiences have demonstrated significant advantages. It was found that virtual tours provided benefits comparable to physical visits while eliminating traditional barriers such as travel time, physical exertion, and geographical constraints [8, 21]. These advantages highlight the unique value proposition of VREX in delivering meaningful cultural encounters without the limitations associated with physical visitation. Hence, the following is postulated.

H6. VREX significantly influences PAD.

2.5. Perceived Enjoyment and Visiting Destination Intention

The influence of PE on technology usage behavior demonstrated its significant role in shaping consumer interactions with technological systems [32]. In the context of VR tourism, this relationship becomes particularly salient as VREX is inherently designed to create enjoyable and engaging virtual encounters with destinations [23]. This understanding was further expanded by highlighting how intrinsic motivation, particularly through PE, can enhance technology adoption in information-seeking contexts [24]. Research emphasized that the PE derived from using technology serves as a crucial motivational factor in continued usage [32].

In virtual tourism environments, the PE takes on added significance as it combines both the hedonic pleasure of technology interaction and the experiential pleasure of destination exploration [33]. Research has shown that when tourists experience PE during virtual destination previews, they develop stronger emotional connections to the destinations and express greater VIS [23]. This effect is particularly pronounced in VREX tourism, where the PE derived from immersive VREX can serve as a powerful catalyst for converting virtual visits into physical visits [24]. Hence, the following is postulated.

H7. PE significantly influences VIS.

2.6. Perceived Advantage and Visiting Destination Intention

The role of PAD in technology adoption has been well-documented across various contexts, particularly in its influence on behavioral intentions. In cultural tourism, PAD is a critical determinant in the adoption of VR, as it has a significant impact on tourists' VIS after virtual previews [8]. These PADs not only enhance the VREX but also serve as motivational factors that drive potential tourists' VIS.

The relationship between PAD and VIS is further illuminated through several cognitive dimensions that work in concert. When users become deeply engaged in the virtual environment, temporarily disconnecting from their physical surroundings, they develop stronger emotional connections to the depicted destinations [25]. This immersive experience, combined with PAD, creates a compelling preview of the actual destination.

Research demonstrated that PAD significantly influences user satisfaction and behavioral intentions, including the desire to transform VREX into physical visits [34]. In the context of VREX in tourism, when users recognize clear PAD from their virtual visits, such as detailed destination previews, enhanced understanding of attractions, and improved trip planning capabilities, they develop stronger VIS [25]. Hence, the following is postulated.

H8. PAD significantly influences VIS.

Figure 1, shows the flowchart of the research methodology through which the objectives of this study were achieved.

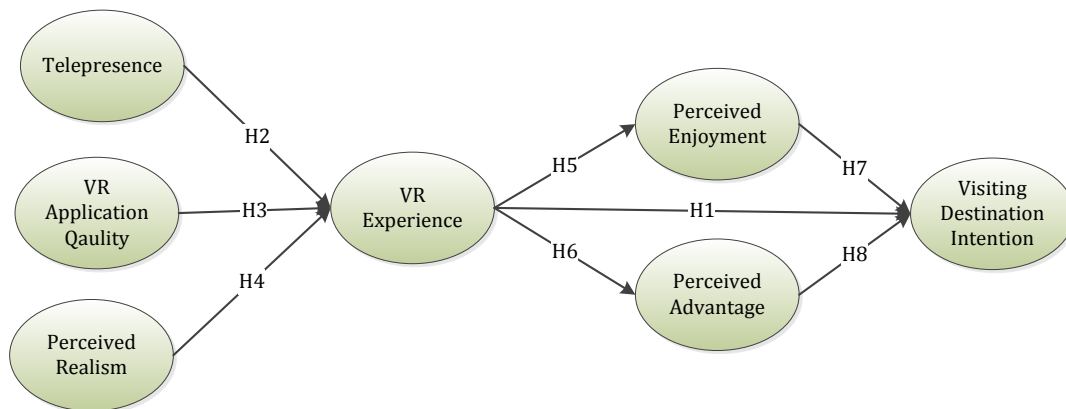


Figure 1. Theoretical Framework

3. Methodology

3.1. Data Collection Procedure

The research methodology employed a systematic data collection approach utilizing the Sojump (WJX.cn) online survey platform, a widely recognized platform in China for academic research endeavors. The data collection phase spanned three months, targeting respondents with prior experience in VR tourism applications, particularly those featuring cultural heritage sites. Survey distribution was conducted through multiple channels to ensure comprehensive coverage, with primary distribution facilitated through established VR tourism platforms and cultural heritage digital experience centers, notably the Jingdezhen Digital Cultural Heritage Experience Center, which utilizes advanced VR technology for cultural tourism applications.

The research design employed a purposive sampling methodology, targeting individuals who met predetermined criteria and could provide informed responses based on their VR tourism experiences. This methodological choice was justified by the necessity to reach participants capable of providing meaningful insights into VR tourism experiences at cultural heritage sites. The sampling framework encompassed multiple distribution channels: prominent social media platforms frequented by cultural tourists and technology enthusiasts (WeChat, Weibo, and Xiaohongshu), specialized VR tourism communities and forums, cultural heritage digital experience centers distributed across various Chinese regions, and tourism-focused academic networks. This multi-channel distribution strategy facilitated sample diversity while maintaining adherence to research objectives.

The data quality assurance protocol implemented rigorous screening criteria. Participation requirements stipulated recent VR tourism application experience within a six-month timeframe, a minimum age threshold of 18 years, mainland China residency, and completion of at least one virtual tourism experience through a VR platform. The survey instrument incorporated comprehensive quality control mechanisms, including strategically positioned attention check questions, temporal controls that excluded responses completed within five minutes to ensure response quality, IP address verification mechanisms to prevent duplicate submissions, and reverse-coded items to ensure response consistency.

3.2. Sample Characteristics

The final sample consisted of 307 valid responses from an initial respondent pool of 428 participants, resulting in a response rate of 71.7%. The sample demographics exhibited appropriate representation across age cohorts (18-55 years) and geographical distribution within China. Content validity was established through a pilot study involving 30 participants, including VR users and tourism domain experts, resulting in refined question formulation and survey structure. The achieved sample size ($n = 307$) exceeded the minimum threshold requirements for PLS-SEM analysis, which prescribe a sample size of at least 10 times the maximum number of paths directed at any construct within the model (Hair et al., 2017). The sample composition demonstrated balanced gender representation (51.2% female) and diverse occupational backgrounds, thereby enhancing the generalizability of the results.

3.3. Data Collection Instrument

The research instrument employed was a survey that utilized a seven-point Likert scale to measure respondents' degree of agreement with various propositions, rather than simply asking for agreement or disagreement. On this scale, seven represented complete agreement, one indicated complete disagreement, and four marked a neutral position. Regarding the selection of the seven-point Likert scale, previous research suggests that scales ranging from five to seven points provide optimal reliability and validity in measurement. While scales with more points (such as 10-point scales) offer finer gradations, they may introduce unnecessary complexity and potentially reduce response reliability. The seven-point scale was selected as it offers sufficient discrimination while maintaining response consistency and ease of use for participants [35].

The items from Atzeni et al. [36] study were used to measure VIS. PREA was measured with the items adopted from Wang et al.'s [1] and Ribbens et al.'s [37] research. VAQ was measured with the items modified from Lee et al.'s [15] study. TLP was measured using items adopted from Wei & Li's [38] research. PE was measured by the items suggested by Yang et. al [39], while the items to measure VREX were modified by Jung et al.'s [40] study. Finally, PAD was measured by the items suggested by Atkinson [41].

The adaptation of measurement items for the Chinese context followed a systematic cross-cultural validation procedure aligned with established methodological protocols [42]. The measurement items underwent a structured translation-back-translation process involving three bilingual experts in tourism and technology management to ensure conceptual equivalence. The original English items were translated into Mandarin Chinese by two independent translators, followed by back-translation from a third expert to verify semantic consistency. The enhancement of cultural appropriateness involved conducting cognitive interviews with 12 Chinese participants (six tourism experts and six potential users) to evaluate item comprehension and cultural relevance. The feedback resulted in linguistic modifications that more accurately reflected Chinese language patterns and cultural nuances. A subsequent pilot study assessed the psychometric properties of the adapted scales. The resultant instrument demonstrated content validity and cultural equivalence while preserving the theoretical integrity of the original constructs.

4. Data Analysis

A partial least squares (PLS) analytical framework guided the data examination process through two sequential stages. Initial evaluations focused on establishing construct validity and reliability metrics, followed by a systematic determination of path coefficients and causal directionality between constructs [43]. The selection of the PLS methodology stems from its demonstrated capability to maintain theoretical relationship integrity while accommodating sophisticated research frameworks [44]. This analytical approach proves particularly valuable when addressing non-normal distribution patterns, as it incorporates specialized indicators for managing randomization effects in data. The investigation employed progressive analytical procedures [45, 46], leveraging the capacity of PLS-SEM to process intricate model structures [47].

The management of potential common method bias (CMB) concerns arising from self-reported measures incorporated both procedural and statistical remedies, adhering to established methodological guidelines [48]. The procedural controls implemented temporal separation by introducing a time lag between the measurement of predictor and criterion variables, which reduced respondents' ability to utilize previous responses for subsequent questions. Statistical assessment initiated with Harman's single-factor test to evaluate potential CMB. An exploratory factor analysis incorporating all measurement items revealed multiple factors, with the first factor accounting for 29.4% of the total

variance, substantially below the 50% threshold that would indicate severe CMB. These results demonstrated that no single factor accounted for a majority of the covariance among the measures. Further examination of construct correlations and their confidence intervals provided additional assessment of discriminant validity and potential common method issues.

4.1. Convergent and Discriminant Validity

The assessment of convergent validity incorporated multiple measurement criteria. Factor loadings and Cronbach's alpha measurements established internal consistency parameters, while rho_A and CR served as key indicators of reliability. The rho_A coefficient specifically evaluates instrumental reliability through weight-based analysis rather than load considerations [49]. Statistical credibility thresholds establish 0.7 as the minimum acceptable value for factor loadings, rho_A, and Cronbach's alpha measurements [50].

The empirical results presented in Table 1 demonstrate that all constructs exceeded the established 0.7 thresholds across factor loadings, Cronbach's alpha, and rho_A measurements. Additionally, CR values surpassed the 0.70 criterion [51], confirming the instrument's internal validity. Convergent validity assessment employed AVE calculations for each construct, with values exceeding 0.5 indicating significant convergent validity [52]. The analyzed constructs exhibited AVE measurements ranging from 0.599 to 0.795, demonstrating robust convergence levels.

Table 1. Convergent Validity

Constructs	Indicators	Factor Loadings	Cronbach alpha	Rho_A	CR	AVE
PAD	PAD1	0.870	0.902	0.910	0.932	0.774
	PAD2	0.883				
	PAD3	0.927				
	PAD4	0.837				
PE	PE1	0.900	0.821	0.826	0.895	0.741
	PE2	0.917				
	PE3	0.757				
PREA	PREA1	0.897	0.914	0.920	0.939	0.795
	PREA2	0.920				
	PREA3	0.869				
	PREA4	0.879				
TLP	TLP1	0.748	0.782	0.794	0.856	0.599
	TLP2	0.825				
	TLP3	0.786				
	TLP4	0.734				
VAQ	VAQ2	0.843	0.837	0.848	0.902	0.753
	VAQ3	0.861				
	VAQ4	0.899				
VREX	VREX1	0.729	0.925	0.928	0.939	0.660
	VREX2	0.880				
	VREX3	0.860				
	VREX4	0.805				
	VREX5	0.808				
	VREX6	0.877				
	VREX7	0.801				
	VREX8	0.724				
VIS	VIS1	0.849	0.884	0.892	0.920	0.741
	VIS2	0.855				
	VIS3	0.874				
	VIS4	0.867				

Note: PAD = Perceived Advantage, PE = Perceived Enjoyment, PREA = Perceived Realism, TLP = Telepresence, VAQ = VR Application Quality, VREX = VR Experience, VIS = Visiting Intention

Discriminant validity assessment quantifies the distinctiveness between theoretical constructs. The evaluation employed the Fornell and Larcker methodology, which utilizes square root calculations of AVE values to examine the relationships between latent variables [52]. As demonstrated in Table 2, the analysis reveals superior construct differentiation, with AVE square root values (indicated in bold text) exceeding cross-construct correlations, confirming that each component accounts for greater variance within its designated construct than concerning other constructs.

Table 2. Fornell-Larcker criterion

Constructs	PAD	PE	PREA	TLP	VAQ	VREX	VIS
PAD	0.880						
PE	0.368	0.861					
PREA	0.533	0.437	0.891				
TLP	0.715	0.522	0.578	0.774			
VAQ	0.579	0.482	0.567	0.632	0.868		
VREX	0.698	0.378	0.631	0.717	0.688	0.812	
VIS	0.470	0.452	0.678	0.521	0.501	0.575	0.861

Note: PAD = Perceived Advantage, PE = Perceived Enjoyment, PREA = Perceived Realism, TLP = Telepresence, VAQ = VR Application Quality, VREX = VR Experience, VIS = Visiting Intention.

The discriminant validity was further analyzed using the confidence intervals (CI) analysis. The 95% CI of the correlations between constructs were examined through bootstrapping with 5000 resamples. As shown in Table 3, none of the confidence intervals included 1.0, with the highest upper bound being 0.951 between PAD3 <- PAD. These results provide additional support for discriminant validity among the constructs [53].

Table 3. Construct Correlations and Confidence Intervals

Relationship	Correlation	Lower CI	Upper CI
PAD1 ← PAD	0.868	0.812	0.908
PAD2 ← PAD	0.881	0.806	0.932
PAD3 ← PAD	0.927	0.900	0.951
PAD4 ← PAD	0.837	0.782	0.881
PE1 ← PE	0.899	0.853	0.931
PE2 ← PE	0.917	0.887	0.939
PE3 ← PE	0.756	0.678	0.818
PREA1 ← PREA	0.897	0.868	0.921
PREA2 ← PREA	0.920	0.891	0.942
PREA3 ← PREA	0.868	0.824	0.904
PREA4 ← PREA	0.879	0.820	0.922
TLP1 ← TLP	0.747	0.656	0.815
TLP2 ← TLP	0.825	0.775	0.868
TLP3 ← TLP	0.783	0.680	0.849
TLP4 ← TLP	0.729	0.603	0.819
VAQ2 ← VAQ	0.842	0.789	0.887
VAQ3 ← VAQ	0.861	0.812	0.903
VAQ4 ← VAQ	0.899	0.868	0.925
VIS1 ← VIS	0.848	0.799	0.888
VIS2 ← VIS	0.854	0.802	0.894
VIS3 ← VIS	0.873	0.825	0.910
VIS4 ← VIS	0.866	0.827	0.898
VREX1 ← VREX	0.726	0.631	0.804
VREX2 ← VREX	0.878	0.832	0.915
VREX3 ← VREX	0.859	0.804	0.904
VREX4 ← VREX	0.802	0.717	0.871
VREX5 ← VREX	0.807	0.738	0.865
VREX6 ← VREX	0.874	0.822	0.914
VREX7 ← VREX	0.799	0.714	0.867
VREX8 ← VREX	0.724	0.612	0.822

Note: PAD = Perceived Advantage, PE = Perceived Enjoyment, PREA = Perceived Realism, TLP = Telepresence, VAQ = VR Application Quality, VREX = VR Experience, VIS = Visiting Intention

4.2. Research Hypotheses Testing

The analytical framework was evaluated through stepwise regression procedures using SmartPLS software [47]. This analytical phase focused on inner model computations, with hypothesis verification conducted through the examination of t-values and p-values. The statistical outcomes of this analysis are presented comprehensively in Table 4.

The empirical analysis indicates differential levels of explanatory power across the model's endogenous constructs. The VREX exhibits the highest predictive accuracy, with an adjusted R-square of 0.634, demonstrating that antecedent variables explain 63.4% of its variance. This value signifies substantial explanatory power according to established thresholds in behavioral science research. PAD demonstrates moderate predictive accuracy, with an adjusted R-squared of 0.485, indicating that the predictor variables explain 48.5% of its variance. The VIS construct exhibits moderate explanatory power with an adjusted R-square of 0.392, suggesting that the model predictors account for 39.2% of its variance. PE shows the lowest explanatory power with an adjusted R-square of 0.140, indicating that the model explains 14% of its variance. Although this value appears relatively modest, it remains within acceptable parameters for exploratory behavioral research in technology adoption studies, particularly in novel contexts such as VR tourism experiences [54].

According to the results of this study, VREX significantly impacted VIS ($\beta = 0.421$, t-value = 6.615). All the antecedents, TLP ($\beta = 0.385$, t-value = 7.679), VAQ ($\beta = 0.315$, t-value = 5.287), and PREA ($\beta = 0.228$, t-value = 4.057) were found to significantly impact VREX. Furthermore, VREX was found to significantly impact PE ($\beta = 0.380$, t-value = 4.671) and PAD ($\beta = 0.695$, t-value = 14.879). Lastly, PE ($\beta = 0.263$, t-value = 3.903) was found to significantly impact VIS, however, PAD ($\beta = 0.080$, t-value = 1.319) was discovered to not have a significant association with VIS.

The non-significant relationship between PAD and VIS warrants examination through multiple theoretical perspectives. The absence of a direct effect may be attributed to the mediating role of other constructs, specifically VREX and PAD, which potentially capture the influence of enjoyment on visiting intentions. This observation aligns with the understanding that while users might find VR tourism content enjoyable, the entertainment element alone may prove insufficient to generate actual visiting intentions. The decision to visit a destination appears to be more significantly influenced by the practical advantages and immersive experiences facilitated by VR technology. This pattern suggests that PAD functions as a necessary but insufficient condition for the formation of VIS within the VR tourism context.

Table 4. Empirical Results

Hypothesis	Path Coefficient (β)	T Values	P Values	Results
H1 : VREX $\rightarrow$ VIS	0.421	6.615	0.000	Supported
H2: TLP $\rightarrow$ VREX	0.385	7.679	0.000	Supported
H3 : VAQ $\rightarrow$ VREX	0.315	5.287	0.000	Supported
H4: PREA $\rightarrow$ VREX	0.228	4.057	0.000	Supported
H5: VREX $\rightarrow$ PE	0.380	4.671	0.000	Supported
H6: VREX $\rightarrow$ PAD	0.695	14.879	0.000	Supported
H7: PE $\rightarrow$ VIS	0.263	3.903	0.000	Supported
H8: PAD $\rightarrow$ VIS	0.080	1.319	0.187	Not supported

Note: PAD = Perceived Advantage, PE = Perceived Enjoyment, PREA = Perceived Realism, TLP = Telepresence, VAQ = VR Application Quality, VREX = VR Experience, VIS = Visiting Intention.

The indirect effects findings are indicated in Table 5. According to the findings, TLP ($\beta = 0.162$, t-value = 4.951), VAQ ($\beta = 0.132$, t-value = 4.378), and PREA ($\beta = 0.097$, t-value = 3.030) were found to indirectly impact VIS, with having VREX as a mediating variable. VREX was found to have an indirect significant association with VIS, mediated by PE ($\beta = 0.099$, t-value = 3.152). However, there was no indirect significance when PAD ($\beta = 0.056$, t-value = 1.299) was used as a mediating variable.

Table 5. Indirect Effects

Indirect Effects	Path Coefficient (β)	T Values	P Values	Results
TLP $\rightarrow$ VREX $\rightarrow$ VIS	0.162	4.951	0.000	Supported
VAQ $\rightarrow$ VREX $\rightarrow$ VIS	0.132	4.378	0.000	Supported
PREA $\rightarrow$ VREX $\rightarrow$ VIS	0.097	3.030	0.002	Supported
VREX $\rightarrow$ PE $\rightarrow$ VIS	0.099	3.152	0.002	Supported
VREX $\rightarrow$ PAD $\rightarrow$ VIS	0.056	1.299	0.194	Not Supported

Note: PAD = Perceived Advantage, PE = Perceived Enjoyment, PREA = Perceived Realism, TLP = Telepresence, VAQ = VR Application Quality, VREX = VR Experience, VIS = Visiting Intention.

5. Discussion

5.1. Comparison of Results

The empirical analysis of the present study revealed a strong positive relationship between VREX and VIS, indicating that immersive virtual encounters have a significant impact on tourists' propensity to visit destinations. This finding aligns with contemporary research conducted in Southeast Asian contexts. A notable investigation by Wismantoro et al. [6] into sustainable tourism practices, incorporating VREX in Indonesia's traditional batik communities, yielded comparable results. The researchers examined how VREX influenced VIS in cultural heritage settings. Their investigation, which surveyed visitors to authentic batik-producing regions, confirmed the substantial impact of VREX on actual VIS. The work was particularly noteworthy for its novel application of virtual reality technology in promoting sustainable community-based tourism in emerging economies.

In terms of antecedents of VREX, all three antecedents—TLP, VAQ, and PAD — were found to impact VREX significantly. A recent meta-analytical investigation by Junior Ladeira et al. [10] provided substantial empirical evidence supporting the relationship between TLP and VREX through rigorous statistical analysis. Their study employed advanced meta-analytic structural equation modeling to assess the impacts of telepresence across multiple virtual platforms, encompassing various digital mediums, from conventional websites to emerging metaverse environments. Their findings conclusively established the positive influence of TLP on VREX, providing a strong theoretical foundation that aligns with the current study's results.

The established relationship between VAQ and VREX aligns with contemporary research in immersive technology applications. A significant empirical investigation by Anwar et al. [55] examined this relationship through the lens of advanced immersive media technologies, with a specific focus on 360-degree video implementations. Their methodological approach involved the development of a comprehensive 360-degree video database, systematically encoded at three distinct bitrate levels utilizing 4K resolution parameters. Through rigorous analysis of their proposed framework and subsequent predictive modeling, the study established a robust correlation between VAQ and the resulting VREX. Their findings demonstrated that the technical quality of virtual reality applications serves as a crucial determinant of the overall immersive experience.

The relationship between PREA and VREX was empirically supported by previous research, particularly through the seminal work of Bowman et al. [56]. Their study advanced theoretical understanding by investigating social realism as a core component of PREA, specifically examining how PREA of virtual characters and events influences entertainment outcomes. The research framework incorporated an analysis of place-based immersion effects, with a specific focus on tourism-related behavioral outcomes. Employing a systematic internal replication methodology, the study collected data from international participants who were engaged with the Assassin's Creed gaming series. The analysis of modern historical gaming experiences yielded that enhanced PREA demonstrated a positive relationship with user enjoyment, while increased spatial immersion correlated significantly with content appreciation. These findings contributed valuable theoretical insights regarding the role of PREA in VREX and its implications for historical gaming applications.

The present study's statistical analysis demonstrated significant correlations between VREX and two key outcome variables: PE and PAD. These results show notable correspondence with the research findings presented by Yu et al. [8] in their examination of virtual reality solutions for addressing constraints in the senior tourism market. Their investigation employed a methodologically rigorous mixed-methods approach to analyze the effects of VREX on the PAD and PE levels of elderly participants. The study's findings revealed statistically significant relationships between the examined variables, contributing valuable insights to the understanding of virtual reality applications in senior tourism activation. The empirical evidence supported the potential of VREX as an effective tool for enhancing senior tourism engagement.

The current analysis revealed a significant relationship between PE and VIS, complementing the theoretical framework established by Ariffin and Susanto [24]. Their investigation explored the complex pathways through which social media influencer (SMI) characteristics impact VIS, specifically examining PE as a mediating factor. The study implemented a purposive sampling strategy, focusing on respondents who had encountered tourism-related SMI content on online platforms. Their analytical results highlighted the significant mediating effect of PE in the relationship between influencer attractiveness and VIS, contributing to the understanding of social media's role in shaping tourism decisions.

When examining the relationship dynamics, the current statistical tests revealed that VIS remained unaffected by PAD. A relevant comparison emerges from Sodawan & Hsu's [57] academic contribution, which explored patterns of tourism behavior. Their research framework incorporated multiple variables, examining how halal-friendly destination features interacted with trust factors, perceived attractiveness, and visit intention. By focusing their data collection on Muslim travelers, they successfully demonstrated that destinations offering halal-friendly characteristics have a positive impact on PAD. Additionally, in destinations outside Islamic regions, their analysis confirmed that PAD acted as a crucial intermediate factor linking contextual destination elements to travel decision-making processes.

The non-significant relationship between PAD and VIS can be explained through multiple theoretical mechanisms. Primarily, within virtual tourism experiences, the cognitive processing of advantages operates distinctly from behavioral intentions, attributed to the experiential nature of VR technology. User engagement with virtual environments suggests that decision-making processes are predominantly influenced by immediate experiential factors rather than utilitarian considerations. Additionally, the psychological distance between virtual advantage recognition and actual visit planning may potentially create a temporal construal effect, wherein immediate emotional responses supersede cognitive benefits in the formation of behavioral intentions. The novelty of VR technology in tourism contexts may lead users to prioritize hedonic aspects over functional benefits when forming visit intentions. This observation suggests that the relationship between PAD and VIS in virtual tourism environments is more complex than previously theorized.

5.2. Theoretical Implications

This empirical investigation advances the theoretical domain of virtual reality tourism by rigorously validating interconnected relationships. The findings establish crucial theoretical pathways by empirically confirming how TLP [10], VAQ [58], and PREA [56] collectively shape VREX. While previous scholars have examined these elements independently, this research framework demonstrates their synchronized impact on immersive virtual encounters.

A distinctive theoretical contribution emerges through the establishment of concurrent mediating mechanisms. Specifically, the study validates how PE [23] and PAD [59] simultaneously mediate the relationship between VREX [1] and VIS [11]. This sophisticated dual-pathway framework illuminates the psychological mechanisms through which virtual encounters translate into travel motivations.

The theoretical framework extends contemporary understanding by positioning VREX as a sophisticated psychological construct rather than a mere technological outcome. This conceptualization highlights how VREX is fundamentally intertwined with cognitive and perceptual mechanisms, thereby establishing a theoretical foundation for virtual presence research [3]. Through systematic empirical validation, this investigation addresses critical gaps in existing virtual tourism literature, offering a comprehensive model that captures the multifaceted nature of virtual reality experiences and their influence on travel behavior.

5.3. Practical Implications

Tourism industry stakeholders gain substantial insights from this empirical investigation into the implementation of virtual reality. Senior executives within the tourism sector should meticulously evaluate three critical success factors in virtual experiences: TLP, VAQ, and PREA of destination representation. Organizations must allocate resources towards sophisticated virtual platforms featuring responsive interfaces and crystal-clear visual elements, as these technical specifications profoundly shape visitor interactions [40]. Marketing teams at destination organizations can leverage these findings when crafting immersive digital tours that authentically showcase their locations.

Industry practitioners must carefully balance experiential and functional aspects within their VREX offerings, as evidenced by the research outcomes. Successful implementation requires thoughtful integration of dynamic features, destination storytelling, and rich sensory elements that forge meaningful connections with potential visitors. Virtual reality platforms serve a crucial role as pre-travel orientation tools, proving particularly valuable for lesser-known destinations or locations perceived as logistically challenging [5]. Such technological solutions effectively address travel uncertainties while promoting familiarity with destinations among target audiences.

Tourism authorities and policy-makers can utilize these research-based insights to construct more encompassing tourism frameworks [2]. Regional tourism boards should evaluate the implementation of comprehensive virtual programs that encompass cultural preservation initiatives, educational outreach efforts, and structured guidelines governing the deployment of technology across various tourism contexts.

5.4. Research Limitations and Future Research Directions

This investigation, while advancing the understanding of virtual reality in tourism contexts, acknowledges several methodological and conceptual boundaries that merit further scholarly attention. Although the present framework thoroughly examines VREX-VIS relationships, certain external moderating elements warrant deeper investigation. Future scholarly endeavors may incorporate moderating variables, such as mobility constraints [60], to develop more sophisticated models of virtual-to-physical travel behavior conversion.

Longitudinal investigations become particularly relevant for tracking the evolution of VREX-VIS relationships, especially considering the rapid advancement of immersive technologies and the growing sophistication of users [61]. Future investigations would benefit from methodological diversification beyond current parameters. While this study provides empirical foundations, subsequent research could integrate interpretive approaches through phenomenological interviews and focused group discussions, illuminating the psychological underpinnings of virtual tourism experiences. Experimental protocols could establish causality between specific VR design elements and user responses, offering precise development guidelines for virtual applications.

Emerging scholarly work should examine how technological innovations influence user engagement and travel intentions. Investigation into the convergence of virtual reality with artificial intelligence [62] and internet-enabled devices could reveal pathways toward more personalized virtual tourism experiences.

Geographic and sample limitations suggest opportunities for cross-cultural investigations and the expansion of empirical studies. Future research could investigate cultural variations in the adoption and effectiveness of virtual tourism, potentially informing the development of culturally adapted virtual applications.

6. Conclusion

The research advances the understanding of VR technology adoption in tourism by examining the antecedents of VREX, including TLP, VAQ, and PREA. It also examines the relationships between PE, VREX, PAD, and VIS within the Chinese tourism context. The results reveal significant theoretical and practical implications for the development of VR tourism. The investigation extends technology acceptance literature by demonstrating the critical mediating role of PE and PAD in translating VREX perceptions into VIS. Statistical analysis revealed significant associations between VREX and VIS, with all three antecedents demonstrating substantial influence on VREX formation. The findings establish that VREX has a significant impact on both PE and PAD dimensions. Notably, while PE emerged as a significant determinant of VIS, PAD demonstrated no substantial effect on visit intentions. These insights benefit tourism practitioners and VR content developers, emphasizing the importance of creating immersive and beneficial VR experiences that extend beyond mere entertainment value. The investigation examines the growing importance of VR technology in Chinese tourism markets, where pre-visit information has a significant impact on decision-making processes. Future research opportunities include exploring longitudinal effects of VR tourism experiences, cross-cultural comparisons of VR adoption patterns, and the integration of additional constructs such as social presence and technological readiness.

7. Declarations

7.1. Author Contributions

Conceptualization, L.Z. and J.Z.; methodology, L.Z., H.Z., and J.Z.; validation, J.Z.; formal analysis, L.Z. and H.Z.; investigation, L.Z.; writing—original draft preparation, L.Z., H.Z., X.C., and J.Z.; writing—review and editing, L.Z., H.Z., X.C., and J.Z.; visualization, L.Z.; funding acquisition, L.Z., H.Z., X.C., and J.Z. All authors have read and agreed to the published version of the manuscript.

7.2. Data Availability Statement

The data presented in this study are available in the article.

7.3. Funding

This study is supported by the following projects: 2024 International Science and Technology Cooperation Project of Henan Province (Project Name: Key Technology Research and Development of Anti-erosion protection materials for stone relics of World Cultural Heritage "Longmen Grottoes"; Project No.: 252102521026); 2025 General Project of Soft Science Research Plan of Henan Provincial Department of Science and Technology (Project Name: Research on Cultural Gene Interpretation and Protection and Inheritance of Industrial Heritage in Henan Province; Project No.: 252400410641); Henan Provincial Department of Education (Project Name: 2022 Research and Practice Project on Research-based Teaching Reform in Undergraduate Colleges and Universities; Project No.: 2022SYJXLX097); The Soft Science Research Project of Henan Province in 2024 (Project Name: Research on the Protection, Inheritance and Development of Cultural Space of Traditional Villages in Henan Yanhuang; Project No.: 242400411147); Research Project on Integration of Production and Education in Undergraduate Universities in Henan Province (Project Name: Comprehensive Reform and Application of Multiple Collaborative Practice Teaching Mode of Design Major under AI Enabling; Project No.: 2023348073); Research and Practice Project on Undergraduate Education and Teaching Reform of Henan Agricultural University (Project Name: Research and Practice on Teaching Reform of General Courses of Public Art in Colleges and Universities in the New Era of "Educating People with Aesthetics and Infiltrating Integration"); Fund of Henan University of Engineering Doctoral Cultivation (Project No.: D2022036); 2024 Zhongyuan Talent Program (Talent Development Series) - Zhongyuan Culture Outstanding Young Talent; 2020 Humanities and Social Sciences Research Project of the Ministry of Education 'Study on the Imagery of the Baima of Yunnan' (20YJA760112).

7.4. Institutional Review Board Statement

Not applicable.

7.5. Informed Consent Statement

Not applicable.

7.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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