

Virtual Reality and the Metaverse in Tourism Marketing: Emerging Technologies and Consumer Adoption Patterns



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Abstract

Virtual reality (VR) and metaverse technologies are fundamentally reshaping tourism marketing paradigms, destination decision-making processes, and experiential offerings. This mini review synthesizes cutting-edge empirical research published between 2022 and 2025, examining how immersive technologies influence tourist behavior, destination image formation, and booking intentions. By analyzing technology acceptance patterns, presence and authenticity perceptions, and adoption barriers, this review identifies critical factors determining consumer engagement with VR tourism experiences. Findings reveal that perceived enjoyment emerges as the strongest predictor of VR usage intention, surpassing traditional technology acceptance model constructs of usefulness and ease of use. Furthermore, the metaverse enables novel applications including blockchain-based tourism products (NFTs), avatar-mediated experiences, and virtual-physical hybrid offerings that transcend conventional marketing approaches. However, significant challenges persist, including infrastructure limitations, content development costs, and the complex relationship between virtual experiences and actual visitation intentions. This review establishes a research agenda addressing knowledge gaps in monetization strategies, ethical frameworks, and the evolving role of virtual authenticity in tourism contexts.

Keywords: Virtual reality; Metaverse; Tourism marketing; Technology acceptance; Destination image; Consumer adoption; Immersive experiences

Abbreviations: TAM: Technology Acceptance Model; VAM: Value-Based Adoption Model; DMOs: Destination marketing organizations; VR: Virtual reality

Introduction

The confluence of virtual reality, augmented reality, and metaverse technologies represents a paradigmatic shift in tourism marketing and destination management [1]. No longer confined to supplementary marketing tools, these immersive technologies now function as primary experiential platforms that reshape how destinations communicate with prospective visitors, how travelers make decisions, and how tourism products are conceptualized and consumed [2]. The COVID-19 pandemic accelerated this transformation, catalyzing demand for remote tourism experiences and prompting destinations to invest in virtual alternatives when physical travel became constrained [3].

Recent market projections underscore the commercial significance of these developments. The global virtual tourism market, valued at USD 728.6 million in 2023, is projected to grow at a compound annual growth rate of 26.4% through 2032, driven by increased demand for immersive experiences, widespread

smartphone adoption, and technological advancements in VR/AR hardware [4]. The broader virtual reality market is expected to reach USD 123.06 billion by 2030, with tourism and hospitality representing a substantial application domain [5].

Despite this rapid expansion, scholarly understanding of how consumers engage with, adopt, and integrate these technologies into their travel planning and destination selection processes remains fragmented. Critical questions persist regarding the psychological mechanisms through which virtual experiences influence actual visitation intentions, the comparative effectiveness of different immersive platforms, and the factors determining consumer willingness to embrace virtual tourism alternatives [6]. This mini review addresses these knowledge gaps by synthesizing the most significant recent research (2022-2025) on VR/metaverse applications in tourism marketing, examining consumer adoption patterns, and identifying future research directions.

Technology Acceptance and Adoption Patterns

Understanding consumer adoption of VR tourism technologies requires extending traditional technology acceptance frameworks to accommodate the experiential and hedonic dimensions that distinguish tourism applications from utilitarian systems. Recent empirical research demonstrates that the Technology Acceptance Model (TAM), while foundational, requires substantial modification to capture the complexity of VR tourism adoption [7,8].

[7] investigated 466 Chinese respondents with VR tourism experience, revealing that perceived enjoyment exerts the strongest influence on usage intention, followed by perceived ease of use, self-efficacy, and perceived usefulness. This finding fundamentally challenges conventional TAM hierarchy, where perceived usefulness typically dominates behavioral intentions in utilitarian contexts. The primacy of enjoyment in VR tourism reflects the experiential nature of tourism consumption, where hedonic value supersedes functional benefits [9].

Self-efficacy emerges as a critical determinant across multiple adoption studies, influencing all three TAM perceptual constructs [6]. Individuals with high self-efficacy-confidence in their ability to operate VR systems-perceive virtual tourism platforms as easier to use, more useful, and more enjoyable. This suggests that tourism marketers must address technology anxiety and provide intuitive interfaces that minimize cognitive burden, particularly when targeting segments with limited technological proficiency [8].

Generational differences significantly moderate adoption patterns. Research examining Generation Z and Millennial cohorts reveals that while both segments demonstrate receptivity to metaverse tourism, their motivations differ substantially [8,10]. Generation Z prioritizes social interaction, novelty, and technology-mediated self-expression, viewing metaverse tourism as an extension of their digital identities. Conversely, Millennials emphasize functional value, convenience, and the ability to preview destinations before committing financial resources. These generational distinctions necessitate segmented marketing strategies that align with cohort-specific values and expectations.

The Value-Based Adoption Model (VAM) provides complementary insights by incorporating perceived benefits and perceived sacrifices. [11] demonstrate that VR quality dimensions-including system quality, information quality, and service quality-collectively determine perceived value, which subsequently influences adoption intention. However, perceived sacrifices, particularly equipment costs and learning effort, substantially moderate this relationship. This cost-benefit calculation varies across market segments, with price-sensitive consumers exhibiting significantly lower adoption propensity despite recognizing VR's experiential benefits.

Presence, Immersion, and Authenticity Dynamics

The psychological construct of presence-the subjective sensation of "being there" in a virtual environment-functions as a critical mediator between VR system characteristics and tourism outcomes [12]. Presence itself comprises multiple dimensions: spatial presence (feeling physically located in the virtual environment), social presence (sensing others' existence), and ecological presence (authenticity of environmental elements) [10,13].

Recent empirical research reveals complex relationships between presence and authenticity in VR tourism contexts, with conflicting findings regarding causal directionality [14,15]. Some scholars argue that technological features induce presence, which subsequently generates perceptions of authenticity [12]. Others contend that authenticity represents a precondition for presence, particularly in heritage tourism where visitors expect genuine cultural representations [16,12] mixed-methods study of CAVE VR museum experiences clarifies this relationship, demonstrating that presence types (spatial, emotional, cognitive) differentially influence authenticity dimensions (objective, constructive, existential), with existential authenticity emerging as the most consequential for visitor satisfaction and behavioral intentions.

The concept of virtual authenticity has emerged as scholars recognize that traditional authenticity frameworks-developed for physical tourism encounters-inadequately address technology-mediated experiences [17]. Virtual authenticity encompasses four dimensions: representational fidelity (accuracy of virtual depictions), technological credibility (believability of the virtual environment), emotional resonance (capacity to evoke genuine feelings), and experiential uniqueness (offering experiences unavailable in physical contexts). This reconceptualization suggests that VR tourism need not merely replicate reality but can create alternative forms of authentic engagement that possess inherent value.

Vividness and interactivity function as primary system characteristics influencing presence and authenticity, though their effects vary across VR and AR modalities [18]. In VR contexts, vividness-the representational richness of the virtual environment-significantly impacts perceived authenticity, while interactivity's influence on presence remains surprisingly modest. Conversely, in AR applications, interactivity substantially affects presence, while vividness demonstrates weaker effects. These modal differences necessitate tailored design approaches that optimize the specific affordances of each technology platform.

Destination Marketing Applications and Outcomes

Destination marketing organizations (DMOs) increasingly deploy VR and metaverse technologies across the entire traveler journey: pre-visit planning, on-site enhancement, and post-visit memory reactivation [19]. Each application stage demonstrates

distinct benefits and challenges that influence marketing effectiveness.

Pre-visit Applications: VR destination previews enable prospective visitors to virtually explore accommodations, attractions, and environments before booking, theoretically reducing uncertainty and increasing booking confidence [20]. Empirical evidence confirms that VR experiences significantly influence destination image formation, with users developing more vivid, differentiated, and favorable disc images compared to traditional media exposure [21]. However, the critical question-whether virtual experiences stimulate or substitute actual visitation-yields mixed findings. Some studies demonstrate that VR previews increase visit intentions by reducing perceived risk and enhancing destination desirability [22]. Others reveal that immersive virtual experiences satisfy exploration motives, potentially reducing motivation for physical travel, particularly among price-sensitive or time-constrained segments [23].

The comparative effectiveness of VR versus conventional media remains contested. [23] conducted controlled experiments comparing VR, 360-degree video, and standard video presentations, finding that while VR generated higher presence and engagement, its incremental impact on destination image and visit intention was surprisingly modest. The authors suggest that VR's effectiveness depends on destination type, with novel or distant locations benefiting more from immersive previews than familiar nearby destinations. This implies that DMOs should strategically deploy VR for destinations where uncertainty is high and vicarious experience provides substantial informational value.

On-site Applications: AR-enhanced tourism experiences overlay digital information onto physical environments, providing navigation assistance, historical context, and interactive content that enriches on-site encounters [24]. Mobile AR applications demonstrate particular promise for heritage tourism, where historical reconstruction and contextual storytelling enhance visitor engagement and educational outcomes [25]. The Scottish tourism app "Portal AR" exemplifies this approach, enabling users to explore destinations through smartphone-based AR, accessing historical overlays and curated content that deepen place understanding.

Metaverse as Distribution Channel: The metaverse enables entirely new tourism products and distribution models [2]. Blockchain technology facilitates NFT-based tourism offerings, where hotels, attractions, and experiences are tokenized as unique digital assets that consumers can purchase, trade, or collect. The Nomo Soho Hotel in New York pioneered this approach, selling tourism packages as NFTs through cryptocurrency marketplaces, creating scarcity and collectability around experiential offerings. While innovative, mainstream adoption faces substantial barriers including consumer unfamiliarity with blockchain, cryptocurrency volatility, and regulatory uncertainty [1].

Avatar-mediated tourism in metaverse platforms like Decentral and Roblox creates hybrid social experiences where users can virtually visit destinations with friends globally, participate in destination-themed events, and engage with branded environments [26]. These applications blur boundaries between tourism, entertainment, and social media, appealing particularly to Generation Z consumers for whom virtual and physical realities represent fluid, interconnected experiential domains.

Barriers and Challenges to Adoption

Despite technological progress and commercial enthusiasm, multiple barriers constrain widespread VR/metaverse tourism adoption. Infrastructure limitations remain paramount, particularly in developing regions where high-speed internet connectivity essential for seamless VR streaming is unavailable or unreliable [4]. This digital divide creates unequal access to virtual tourism opportunities, potentially exacerbating existing inequalities in tourism participation.

Content development costs present significant obstacles for smaller DMOs and tourism enterprises [3]. Creating high-quality VR experiences requires specialized equipment, technical expertise, and substantial production budgets that exceed the resources of many destinations, particularly in secondary markets. The result is that VR tourism marketing remains concentrated among well-funded destinations and large hospitality corporations, limiting diversity in virtual tourism offerings.

Hardware accessibility constrains consumer adoption despite declining VR headset prices [5]. Many consumers lack VR equipment and resist purchasing dedicated devices for occasional tourism planning use. While smartphone-based VR offers more accessible alternatives, the experience quality significantly diminishes compared to dedicated VR systems, reducing presence, immersion, and ultimately behavioral impact [11].

VR sickness-physiological discomfort including nausea, disorientation, and eyestrain-affects substantial portions of users, particularly during extended VR sessions or with lower-quality systems [13]. This creates negative associations with VR tourism experiences that may inhibit adoption and reduce willingness to engage with virtual destination previews.

Perhaps most critically, the relationship between virtual experiences and actual visitation remains ambiguous and context-dependent [6]. While some consumers view VR as a trip planning tool that increases booking confidence, others perceive immersive virtual experiences as substitutes that satisfy wanderlust without requiring the expense, time, and effort of physical travel. This substitution effect particularly concerns DMOs investing in VR marketing, as the intended outcome-stimulating visitation-may inadvertently be undermined by providing satisfying virtual alternatives.

Future Research Directions and Implications

This synthesis of recent literature reveals several critical research gaps requiring empirical attention. First, longitudinal studies tracking how VR exposure influences actual booking behavior across extended timeframes are virtually absent. Most existing research relies on cross-sectional designs measuring stated intentions rather than observed behavior, creating potential intention-action gaps that overestimate VR's marketing effectiveness.

Second, comparative research examining VR effectiveness across destination types, tourism segments, and cultural contexts remains limited. The assumption that VR benefits generalize uniformly across contexts likely oversimplifies a more nuanced reality where VR's value proposition varies substantially based on destination characteristics, market segments, and cultural norms regarding technology adoption.

Third, ethical considerations surrounding metaverse tourism require theoretical and empirical development [2]. Issues including data privacy, algorithmic bias in personalized recommendations, NFT speculation's economic implications, and the environmental footprint of blockchain technologies demand scholarly attention and policy guidance.

Fourth, the economic viability of metaverse tourism business models remains unproven. While technological possibility exists, sustainable revenue models that justify substantial development investments are still emerging. Research examining willingness to pay for virtual tourism experiences, optimal pricing strategies, and monetization approaches could inform practical implementation decisions.

Finally, the social and psychological consequences of substituting virtual for physical tourism merit investigation. If segments of potential travelers increasingly satisfy wanderlust virtually, implications extend beyond tourism economics to include reduced intercultural contact, diminished environmental awareness stemming from direct nature exposure, and potential changes in place attachment and identity formation processes traditionally linked to physical travel.

Conclusion

Virtual reality and metaverse technologies are transforming tourism marketing from supplementary tools into foundational platforms that reshape destination communication, traveler decision-making, and experiential consumption. The evidence synthesized in this review demonstrates that VR tourism adoption is driven primarily by hedonic value-particularly perceived enjoyment-rather than functional benefits, distinguishing tourism applications from utilitarian technology contexts. Presence and authenticity emerge as critical psychological mediators, though their relationship remains complex and context-dependent, with virtual authenticity potentially transcending rather than merely

replicating physical authenticity.

Destination marketing applications span the entire traveler journey, with VR destination previews influencing image formation and booking confidence, AR enhancing on-site experiences through contextual overlays, and metaverse platforms enabling novel tokenized tourism products and avatar-mediated experiences. However, significant barriers including infrastructure limitations, content development costs, hardware accessibility, and ambiguous relationships between virtual exposure and actual visitation constrain widespread adoption and effectiveness.

The metaverse promises to revolutionize tourism marketing through immersive, personalized, and socially connected experiences that transcend physical constraints. Yet realizing this potential requires addressing technological barriers, developing sustainable business models, establishing ethical frameworks, and deepening scholarly understanding of how virtual and physical tourism experiences interact to shape destination choice and consumption patterns. As these technologies mature and adoption accelerates, tourism researchers and practitioners must critically examine both the opportunities and risks inherent in this digital transformation of an industry fundamentally grounded in physical place-based experiences.

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