

CONSTRUCTING A THEORETICAL FRAMEWORK OF ENDLESS VISUAL DESIGN THINKING FOR IMMERSIVE CULTURAL TOURISM ARCHITECTURE

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ABSTRACT

In the era of experiential economy, cultural tourism architecture faces the dual challenges of spatial homogenization and superficial cultural expression. This paper proposes a novel design paradigm titled "Endless Visual Design Thinking." By synthesizing Flow Theory, Scenario Interaction, and the FIVE immersive framework, the study constructs a five-dimensional theoretical structure: Endless Spatiality, Temporality, Culturality, Chromaticity, and Materiality. Taking the "Rain Water" and "Qian Stage" projects as preliminary evidence, the research demonstrates how this framework can transform static architectural forms into dynamic, immersive cultural experiences. This study provides a systematic methodological guide for architects to foster deep emotional resonance and sustainable cultural inheritance.

Keywords: Endless Visual Design Thinking, Cultural Tourism Architecture, Immersive Experience, Scenario Interaction, Sustainable Design, Architectural Perception

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INTRODUCTION

In the contemporary era, cultural tourism has transcended the traditional boundaries of simple sightseeing, evolving into a complex form of "experiential consumption." Architecture, as the primary physical carrier of these cultural experiences, is no longer merely a functional shelter but has become a medium for storytelling and emotional resonance. The global shift toward the "Experience Economy" demands that architectural spaces provide deeper psychological engagement. However, despite the rapid expansion of cultural tourism destinations, a significant portion of modern architecture suffers from "homogenization" a phenomenon where distinct regional identities are replaced by repetitive, standardized visual languages. This crisis of identity necessitates a reimagining of how visual design can foster a more profound connection between the visitor, the culture, and the built environment.

The core problem addressed in this research is the prevailing "visual fragmentation" and "cultural superficiality" in current architectural practices. First, many projects exhibit a sharp disconnect between interior and exterior spaces, landscape and structure, leading to a fragmented visitor experience that lacks continuity. Second, cultural elements are often treated as superficial "decorations" rather than being integrated into the spatial logic of the building. This "pasted-on" approach fails to trigger what psychologists call the "Flow Experience" a state of deep immersion where the observer becomes one with the environment. Without a continuous and endless visual narrative, the architecture remains a static object rather than a living cultural entity.

To address these challenges, this study proposes a novel theoretical paradigm: "Endless Visual Design Thinking." The term "Endless" in this context does not merely refer to infinite physical scale, but rather to the continuity, fluidity, and multi-dimensional extension of the visual experience. It suggests a design philosophy where boundaries between space and time, between material and light, and between tradition and modernity are blurred to create a seamless perception of cultural depth. This thinking aims to transform the observer's role from a passive spectator to an active participant within a boundless cultural narrative.

RESEARCH OBJECTIVES

This research focuses on constructing a systematic framework for Endless Visual Design Thinking by integrating interdisciplinary theories such as Flow Theory and Scenario Interaction. The scope of this research encompasses the entire life cycle of selected landmark projects, specifically focusing on the "Rain Water" 24 Solar Terms Marine Park in Dalian and the "Qian Stage" in Only Henan·Drama City. By analyzing these cases, the study seeks to demonstrate how the five dimensions of Endless design (Spatiality, Temporality, Culturality, Chromaticity, and Materiality) can be practically applied to revitalize cultural spaces and enhance sustainable visitor engagement.

LITERATURE REVIEWS

Domestic Related Research

Current domestic research in China primarily focuses on architectural structural logic, spatial composition theories, and scenario planning within the cultural tourism industry.

Structural and Spatial Foundations: In *The History of Ancient Chinese Architecture*, Liu Dunzhen (1984) conducted in-depth research on the structural rationality of timber frames and mortise-and-tenon systems. This provides a vital foundation for understanding the Endless possibilities of spatial combination and expansion within the Chinese architectural context. Furthermore, Peng Yigang (2008), in *Theory of Architectural Space Composition*, systematically elaborated on the artistic laws of spatial organization, emphasizing the organic integration of function, technology, and aesthetics. His work serves as the theoretical support for exploring narrative sequences in immersive spaces in this study.

Immersive Design and Scenario Planning: He Yongjun (2017) emphasized the core role of visual perception principles in immersive interactive design, noting that design must delve into visual cognitive mechanisms. Wei Xiaolan and Wei Shihua (2004) proposed "Tourism Scenario Planning and Project Experience Design," advocating for differentiated experiences through the holistic planning of time and space.

Summary of Current State: While domestic research has achieved significant results in cultural symbolism and scenario development, there remains a distinct theoretical gap regarding the construction of a "visual continuity" framework to achieve deep immersion.

Overview of Relevant Foreign Research

International research tends to emphasize psychological perception, multi-sensory atmospheric creation, and objective evaluation systems for immersive technologies.

1) Atmosphere and Emotional Perception: In *Atmospheres*, Peter Zumthor (2006) posited that architectural atmosphere is the product of the combined action of various sensory elements such as materials, light, and sound emphasizing the emotional resonance between the individual and the environment.

2) Immersion Evaluation Frameworks: Slater and Wilbur (1997) proposed the FIVE Framework, distinguishing between "Immersion" (as an objective technical metric) and "Presence" (as a subjective psychological experience). This provides a scientific standard for evaluating the depth of immersion within architectural spaces.

Summary of Current State: International research provides the perceptual and psychological foundations for this study, highlighting the importance of a seamless connection between the visitor and the cultural heritage.

3) Benchmark Analysis: Traces of Endless Thinking in Global Masterpieces

To validate the universality of the "Endless" dimensions, this study selects three global landmarks for benchmark analysis:



Figure 1 The Church of the Light, one of the most famous buildings in Japan, is the masterpiece that brought Japanese architect Tadao Ando to fame.

Church of the Light (Endless Temporality & Spatiality): Tadao Ando utilizes the "Cross of Light" to dissolve the solidity of the concrete wall. Here, light is not just an accent but a structural void that introduces a sense of infinite spirituality, perfectly illustrating the fusion of Temporality and Spatiality.

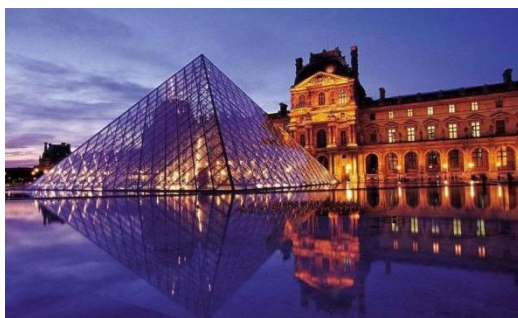


Figure 2 The Louvre Pyramid "The above image shows the Louvre's glass pyramid, a work by the late design master I.M. Pei."

Louvre Pyramid (Endless Materiality & Chromaticity): I.M. Pei's use of high-transparency glass achieves a dialogue between the historical palace and modern geometry. The pyramid's ability to reflect the shifting sky - achieving Endless Chromaticity - proves that modern materials can create a boundless visual bridge across eras.



Figure 3 The Louvre ABU Dhabi was designed by Jean Nouvel, one of France's most famous architects

Louvre Abu Dhabi (Endless Culturality & Temporality): Jean Nouvel's "Rain of Light" dome reinterprets traditional Arab lattice patterns. By creating a dynamic interior atmosphere through a complex multi-layered roof, the design demonstrates how Culturality can be woven into a temporal experience that feels both ancient and futuristic.

Theoretical Foundations: The Four Pillars

The "Endless Visual Design Thinking" model constructed in this study is not an isolated creative concept but is firmly anchored in a multi-disciplinary theoretical matrix. This matrix consists of four foundational pillars that bridge psychology, architectural history, environmental aesthetics, and the experience economy.

1) Perception & Cognition: Psychological Mechanisms of Deep Immersion The first pillar utilizes Flow Theory and the FIVE Framework as its cognitive core. Flow Theory, as defined by Csikszentmihalyi, describes a state of "optimal experience" where an individual becomes so intensely involved in an activity that nothing else seems to matter. In the context of cultural tourism architecture, this research argues that "Endless" visual cues such as a lack of sharp visual boundaries and the continuity of material patterns act as the primary triggers for this state. By minimizing "visual friction," the architecture allows the visitor's consciousness to flow seamlessly into the environment. Furthermore, the FIVE Framework (Fidelity, Immersive, Vividness, and Extensive) provides the objective criteria to measure this immersion. High-fidelity materials and vivid light-shadow interactions ensure that the visitor's "presence" is not merely a superficial observation but a deep-seated psychological belief in the reality of the cultural narrative being presented.

2) Culture & Society: Structural Logic and Hereditary Narrative The second pillar is grounded in the structural logic of ancient Chinese architectural history. Rather than treating culture as a series of pasted-on symbols, this study looks at the "generative logic" of traditional structures, such as the timber frame systems researched by Liu Dunzhen. These systems are inherently "Endless" because of their modularity; they allow for infinite expansion and internal reconfiguration. This pillar ensures that the visual design thinking is an act of hereditary innovation. By translating the abstract "soul" of traditional craftsmanship into modern spatial languages (such as the white steel weaving in the Qian Stage), the design ensures a continuous inheritance of cultural connotations. This prevents the "cultural superficiality" often found in modern projects and establishes a profound, boundless dialogue between the visitor and their heritage.

3) Environment & Atmosphere: The Creation of Emotional Resonance Fields The third pillar integrates spatial composition theory with Peter Zumthor's Atmospheric Theory. An "Endless" environment is not defined by its physical square footage but by its ability to create a "field" of emotional resonance. This pillar focuses on how non-solid elements specifically light, shadow, and reflection can dissolve the perceived mass of a building. When light is treated as a sculptural material, it introduces a temporal dimension (Endless Temporality) that makes the space feel alive and ever-changing. The atmospheric approach prioritizes the "sensory density" of the space, ensuring that every visual touchpoint from the hue of a reflected sunset to the texture of a woven metal surface contributes to a unified, boundless narrative that resonates with the visitor's subconscious.

4) Experience & Economy: Strategic Differentiation in Scenario Planning The final pillar applies Experience Economy theory and tourism scenario planning to ensure the practical viability of the "Endless" framework. In a saturated market, cultural tourism projects face intense competition; therefore, architectural design must serve as a tool for strategic differentiation. This pillar advocates for the transition from "space-making" to "scenario-making." By holistic planning of the visitor's time-space journey, the architecture becomes a continuous "performance" where every visual transition is a planned scene. This "Endless" scenario logic enhances the market competitiveness of projects by fostering sustainable engagement visitors are prompted to return not just to see a building, but to re-experience a dynamic, shifting cultural atmosphere that can never be fully "consumed" in a single visit.

RESEARCH METHODOLOGY

Parallel Mixed Methods (MMR)

This study employs a Parallel Mixed Methods Research (MMR) approach, ensuring the scientific rigor and practical significance of the theoretical framework through complementary qualitative and quantitative analyses.

Qualitative Research:

Expert Interviews: Conducting interviews with 3-5 experts in architecture and visual design to validate the rationality of the Endless theoretical dimensions.

Field Investigation: Performing on-site research at the "Rain Water" 24 Solar Terms Marine Park in Dalian and the "Qian Stage" in Only Henan to analyze the practical effectiveness of spatial continuity and cultural expression.

Quantitative Research:

Questionnaire Surveys: Collecting 300 + visitor questionnaires and utilizing SPSS software for data analysis.

Data Validation: Using empirical data to prove that visual elements such as light-shadow continuity and material texture significantly enhance visitor presence and immersion depth, thereby validating the effectiveness of Endless Visual Design Thinking.

RESEARCH RESULTS

Construction Results of the Endless Theoretical Framework

This research concludes that the "Endless" visual design paradigm is not a singular aesthetic style but a multi-layered systemic structure. The framework is designed to solve the "visual fragmentation" of contemporary tourism architecture by ensuring that the observer's perception remains in a state of continuous expansion. The construction results define five interdependent dimensions, which collectively facilitate the transition from a static "site" to a dynamic "experiential field."

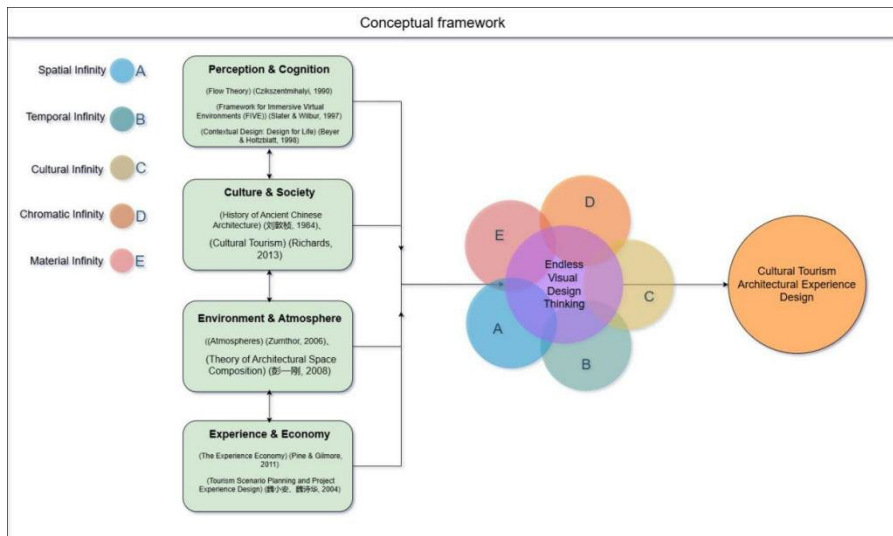


Figure 4 Conceptual Framework

1) Endless Spatiality: The Dissolution of Physical and Perceptual Boundaries The foundation of the framework lies in Endless Spatiality. Traditional architectural thinking often treats boundaries walls, roofs, and floors as definitive separators. However, this research demonstrates that through the strategic use of visual lead lines and spatial superposition, these boundaries can be "liquefied." By creating a panoramic circulation flow, the design ensures that there is no singular focal point, but rather a series of unfolding perspectives. This spatial continuity forces the visitor's eye to move constantly, preventing the psychological "closing" of a space. When the physical boundary of a building (the "shell") is visually integrated with the landscape (the "context"), the resulting spatial field is perceived as boundless.

2) Endless Temporality: Capturing the Variables of Light and Shadow While space provides the structure, Endless Temporality provides the life. Architecture is often perceived as a static, frozen moment in time. The Endless framework challenges this by treating light as a dynamic building material. By capturing the subtle shifts of natural light from the sharp angles of a morning sun to the soft diffusion of twilight the architecture becomes a recording device for the passage of time. This dimension ensures that the building is never the same at two different moments. The interplay of shadows introduces a "temporal depth" that connects the immediate present with the cyclical rhythms of nature (such as the 24 solar terms), thereby extending the visitor's experience into an eternal, shifting narrative.

3) Endless Culturality: Narrative Continuity and Symbolic Resonance Endless Culturality is the soul of the framework, ensuring that the visual experience is grounded in deep-seated meaning. In many modern projects, culture is reduced to a "scenographic decoration." The Endless paradigm, conversely, advocates for Narrative Continuity. This involves identifying the core "genetic markers" of a culture (such as the social hierarchy of a Song Dynasty stage or the ritualistic nature of rainwater) and embedding them into the spatial logic. When the architecture tells a story that has no clear beginning or end, but rather feels like a segment of a larger, ongoing historical long-form, the visitor experiences a sense of cultural belonging that transcends the physical limitations of the site.

4) Endless Chromaticity: Light-Induced Dynamic Transformations Color, in the Endless framework, is redefined as Endless Chromaticity a non-constant, light-induced phenomenon. Instead of applying fixed pigments, the design utilizes materials with high reflective or refractive properties to "harvest" the colors of the surrounding environment. Under this logic, the building's hue changes in real-time with the weather, the seasons, and the angle of the sun. This dynamic transformation imbues the architecture with a "biological" quality; it breathes with its environment. This non-constancy is crucial for maintaining long-term engagement, as

the visual stimulus is constantly refreshed, preventing the "sensory adaptation" that often leads to visitor boredom.

5) Endless Materiality: The Fusion of Fidelity and Tactile Perception The final dimension, Endless Materiality, serves as the physical anchor for the entire framework. Drawing on the Fidelity metric from the FIVE framework, this dimension emphasizes the importance of material texture in fostering immersion. When the visual logic of a material (e.g., the weave of a steel mesh) is consistent with the tactile and atmospheric expectations of the visitor, it triggers a state of deep "presence." Endless Materiality explores the infinite possibilities of a single substance how concrete can feel like silk under certain light, or how metal can mimic the transparency of water. By blurring the line between the artificial and the natural, the materiality reinforces the overall sense of a seamless, boundless reality.

6) The Logical Linkage: From Pillars to Dimensions: To prevent the theoretical framework from appearing as a collection of disparate concepts, this research establishes a direct evolutionary bridge between the "Four Pillars" of foundation and the "5 Dimensions" of the Endless framework. Each dimension is a specific spatial manifestation of these core theories: From Pillar 2 (Liu Dunzhen's Structural Logic) to "Endless Materiality": The "Endless Materiality" dimension is directly informed by Liu Dunzhen's emphasis on the "rationality of structure." In projects like the Qian Stage, materiality is not treated as a surface finish but as a structural language. By applying Liu's logic of structural deconstruction, the material (white steel weaving) dissolves physical boundaries, allowing the structure itself to facilitate a visual flow. From Pillar 3 (Zumthor's Atmospheric Theory) to "Endless Chromaticity": Peter Zumthor's theory of "Architectural Atmospheres" serves as the primary driver for "Endless Chromaticity." Following Zumthor's focus on the sensory impact of light and materials, this dimension treats color not as a static pigment, but as a dynamic medium that dictates the emotional "temperature" of the cultural space, ensuring that the visitor's immersion is sustained through chromatic continuity.

Synthesis of Pillars into a Unified Paradigm: Collectively, these pillars ensure that the resulting framework is not merely a descriptive list of design traits but a unified design paradigm. This synthesis ensures that Endless Temporality and Endless Culturality are grounded in the interaction between historical continuity and modern experiential needs, transforming the "Pillars" into actionable architectural tools.

7) Quantitative Evidence and Demographic Profile: To validate the "Endless Visual Design Thinking" framework, a parallel mixed-methods approach was conducted across two case sites: "Rain Water" (n=164) and "Qian Stage" (n=177), totaling 341 respondents. The demographic profile (Table 1) reveals a balanced gender distribution and a predominant age group of 36–60 years, representing the primary demographic for cultural tourism.

Table 1 Demographic Profile of Respondents (N=341)

Characteristics	Category	Rain Water (n=164)	Qian Stage (n=177)
Gender	Male / Female	57.9% / 42.1%	43.5% / 56.5%
Primary Age Group	36–60 years	60.98%	58.76%
Youth Group	18–35 years	29.88%	41.24%

Case Analysis A: "Rain Water" 24 Solar Terms Marine Park in Dalian

The core of the "Rain Water" project lies in transforming natural phenomena into architectural forms through visual thinking. In the dimension of Spatiality, the design utilizes cantilever structures and water-drop shapes to dissolve physical boundaries through a panoramic circulation route, creating a "floating dream" sense of spatial extension. The movement of visitors across multi-level viewing platforms is no longer a simple physical displacement but an expansion of the perceptual field achieved through mirror reflections.



▲ Front view ▲ Side view

Figure 5 24 Solar Terms Sea Park - Rain Water

Design Company: Dalian Xuanshu Space Architectural Design Institute

The research instrument utilized a 5-point Likert scale to operationalize the five "Endless" dimensions into measurable variables. In the "Rain Water" project, the application of mirror stainless steel successfully dissolved physical boundaries, with 85.37% (Highly Agree + Agree) of respondents recognizing its Endless Spatiality. Similarly, 84.15% of participants identified the Endless Chromaticity, confirming that the color transitions effectively enhanced atmospheric immersion.

Case Analysis B: "Qian Stage" in Only Henan • Drama City

The "Qian Stage" case epitomizes the reconstruction of traditional narratives through modern materials. In the dimensions of Spatiality and Materiality, the design abandons solid wall connections in favor of a "de-boundary" approach using a white steel weaving process. This fabric-like structure retains the silhouette of ancient architecture while creating a translucent visual texture. The audience's line of sight can penetrate the woven mesh, enabling a free flow between interior and exterior spaces. This visual effect of "intertwining virtual and real" greatly enriches the perceptual dimension of the space.



Figure 6 Qian Stage

In the "Qian Stage" project, the integration of white steel weaving was highly effective in conveying Endless Spatiality (81.36% agreement) and Endless Culturality (79.66% agreement). These findings indicate that while the two projects employ different materials - reflective versus woven - both consistently facilitate a high level of visitor resonance with the core theoretical framework.

8) Qualitative Insights from Expert Interviews: To bolster the "rationality" and academic depth of the framework, semi-structured interviews were conducted with three prominent experts in the fields of architecture and art design from Dalian University of Technology and Dalian Polytechnic University. The thematic analysis of their feedback provides a robust evidentiary narrative for the framework's validity.

A. Evaluation of the Theoretical Framework Professor Tang Jian (Dean of the School of Architecture and Fine Arts, DUT) noted that the "Endless" framework effectively bridges the gap between traditional architectural logic and contemporary experiential demands. He stated:

"The integration of Liu Dunzhen's structural precision with a fluid, multi-dimensional visual strategy provides a timely response to the homogenization of modern cultural tourism sites."

B. Case Analysis: "Rain Water" and "Qian Stage" Dr. Ma Hui (Vice Dean, DUT) highlighted the success of the "Qian Stage" in applying the Endless Materiality dimension. He observed that: "The choice of white steel weaving is not merely aesthetic; it serves as a structural metaphor for cultural continuity, successfully transforming a static platform into a dynamic dialogue between the viewer and the heritage."

C. Innovation and Future Application Associate Professor Liu Lijian (Vice Dean, Dalian Polytechnic University) emphasized the framework's potential in academic and professional training, asserting that:

"The 'Endless' paradigm offers a systematic methodology for students and practitioners to move beyond superficial cultural symbolism toward deep-seated spatial immersion."

9) Comparative Analysis of Material Strategies for "Endless Temporality": To provide architects with concrete insights, it is essential to compare how different material strategies manifest the dimension of Endless Temporality in the "Rain Water" and "Qian Stage" projects. While both aim to dissolve temporal boundaries, their technical executions offer distinct methodological paths:

Reflective Dissolution in "Rain Water" (Dalian): This project utilizes high-mirror stainless steel to create a "visual loop." By reflecting the ever-changing sky and surrounding aquatic environment, the materiality functions as a real-time temporal sensor. The "Endless" quality here is achieved through occlusion-free reflection, where the architectural boundary disappears into the immediate environmental context, making the present moment feel eternal.

Structural Continuity in "Qian Stage" (Henan): In contrast, the "Qian Stage" utilizes white steel weaving as a medium for Endless Temporality. Instead of reflecting the environment, it uses the repetition of woven patterns to create a sense of rhythmic infinity. The materiality here is a structural metaphor for cultural lineage; the "Endless" quality is derived from the interplay of light and shadow passing through the lattice, evoking a sense of historical continuity that transcends the physical site.

Table 2 A Comparison of Material Mechanisms and Architectural Effects of "Endlessness"

Project	Primary Material	Mechanism for "Endless" Effect	Architectural Result
Rain Water	Mirror Stainless Steel	Environmental Reflection	Boundary Dissolution (Spatial-Temporal)
Qian Stage	White Steel Weaving	Rhythmic Patterning	Cultural Continuity (Symbolic-Temporal)

Critique: While highly effective, the "Rain Water" strategy relies heavily on optimal weather conditions for its maximum "Endless" effect, whereas the "Qian Stage" provides a more stable, albeit more abstract, temporal experience regardless of environmental flux.

DISCUSSION AND CONCLUSION

This study concludes that "Endless Visual Design Thinking" serves as a vital paradigm for the future of cultural tourism architectural design. By synthesizing traditional Chinese structural wisdom exemplified by the mortise-and-tenon logic researched by Liu Dunzhen (1984) with contemporary immersive theories such as Flow Theory and the FIVE Framework, designers can create spaces that are not only functional but also possess deep emotional and cultural resonance.

The five-dimensional framework proposed in this study (Spatiality, Temporality, Culturality, Chromaticity, and Materiality) provides a systematic design methodology. It ensures that the

architectural experience is perceived as a continuously unfolding and infinitely evolving process, rather than a series of static, disconnected fragments. While this research is grounded in specific landmark cases in China, the principles of "Endless" design possess universal applicability. The primary limitation of the study lies in its dependence on current technological fidelity; however, as digital and physical integration technologies continue to advance, the possibilities for "Endless" design will further expand. Future research should explore how artificial intelligence-driven adaptive environments can be integrated into this framework to further push the boundaries of "infinite" architectural experiences.

REFERENCES

- Bekele, M. K., & Champion, E. (2020). *A Comparison of Immersive Technologies and Interactivity in Virtual Heritage*. Multimodal Technologies and Interaction.
- Berto, R., Barbiero, G., Pasini, M., & Unema, P. (2021). *Biophilic Design and Immersive Technologies: A New Frontier for Restorative Architecture*. Sustainability.
- Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. Harper & Row.
- He, Y. (2017). Research on the Application of Visual Perception Principles in Immersive Interactive Design. *Popular Literature and Art*, (24), 90-91.
- Liu, D. (1984). *History of Ancient Chinese Architecture*. Beijing: China Architecture & Building Press.
- Peng, Y. (2008). *Theory of Architectural Space Composition*. Beijing: China Architecture & Building Press.
- Pine, B. J., & Gilmore, J. H. (2011). *The Experience Economy*. Harvard Business Review Press.
- Slater, M., & Wilbur, S. (1997). A framework for immersive virtual environments (FIVE): Speculations on the role of presence in virtual environments. *Presence: Teleoperators & Virtual Environments*, 6(6), 603-616.
- Wei, X., & Wei, S. (2004). *Tourism Scenario Planning and Project Experience Design*. Beijing: China Tourism Press.
- Zhang, L., & Han, M. (2023). Digital Twins and Cultural Heritage: Enhancing Immersion in Historic Spaces through Virtual-Physical Integration. *Journal of Cultural Heritage Management and Sustainable Development*.
- Zumthor, P. (2006). *Atmospheres: Architectural Environments - Surrounding Objects*. Birkhäuser.

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