Research on Strategies for the Integrated Development of Broadcasting Technology and Environmental Art in Cultural Tourism Projects (Postprint)

Authors: Ren Jiaxuan

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Abstract

In recent years, with national support for equipment renewal in the media, culture, and tourism sectors, the cultural tourism industry has experienced vigorous development, with environmental art, broadcasting technology, and related media fields attracting considerable attention. [Objective] This study aims to deeply explore effective strategies for integrating broadcasting technology and environmental art, enhance the quality of cultural tourism projects, facilitate the transformation and upgrading of the cultural tourism industry beyond traditional models, preserve regional culture, strengthen tourist recognition of and participation in cultural tourism projects, and promote industry development. [Method] The article primarily analyzes the theoretical foundations of broadcasting technology and environmental art across multiple dimensions, including their respective scopes, characteristics, concepts, and interrelationships. [Result] Through investigation of multiple cultural tourism projects and analysis of successful cases, it identifies existing issues such as coordination deficiencies, innovation shortages, and lack of systematic planning. The study subsequently proposes integration strategies from technical, artistic design, content creation, and operational management perspectives, while offering prospects for future integration trends. [Conclusion] A more systematic integration of broadcasting technology and environmental art can enhance the attractiveness and competitiveness of cultural tourism projects, enrich tourist experiences and cognition, and elevate the cultural connotations and artistic quality of projects.

Full Text

Preamble

Research on Integration Strategies for Broadcasting Technology and Environmental Art in Cultural Tourism Projects

(China Broadcasting Film and Television Design and Research Institute Co., Ltd., Beijing 100045)

Abstract

In recent years, with national support for equipment renewal across media, culture, and tourism sectors, the cultural tourism industry has experienced vigorous growth, drawing significant attention to environmental art, broadcasting technology, and related media fields. This study aims to identify effective strategies for integrating broadcasting technology and environmental art to enhance project quality, facilitate industrial upgrading beyond traditional models, preserve regional culture, and strengthen tourist recognition and participation, thereby advancing the cultural tourism industry. The article analyzes the theoretical foundations of both domains, examining their scope, characteristics, concepts, and interrelationships. Through investigation and case analysis of multiple cultural tourism projects, it identifies existing issues such as coordination deficiencies, lack of innovation, and insufficient systematic planning. The study subsequently proposes integration strategies from technical, artistic design, content creation, and operational management perspectives, while offering prospects for future integration trends. The conclusion indicates that more systematic integration of broadcasting technology and environmental art can enhance the appeal and competitiveness of cultural tourism projects, enrich visitor experiences and cultural cognition, and elevate the cultural connotation and artistic quality of projects.

Keywords: broadcasting technology; environmental art; cultural tourism projects; integrated development; strategic research

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1. Theoretical Foundations

1.1 Scope and Characteristics of Broadcasting Technology

Broadcasting technology, formally known as radio and television technology, represents a comprehensive discipline encompassing electronics, computer science, media technology, acoustics, and optical imaging in radio, film, and television. It also extends to emerging fields such as online audiovisual content and artificial intelligence. Signal transmission has evolved from analog to digital, dramatically improving information quality and efficiency. Content production integrates various technical methods including image processing, audio engineering, and post-production editing. Broadcasting system infrastructure encompasses spe-

cialized systems for technical facilities such as studios, recording rooms, and live broadcast spaces, including content production and broadcasting, audio-video systems, and stage machinery design.

1.2 Concept and Expression Forms of Environmental Art

Environmental art is an artistic form that integrates creative works with specific spatial environments, representing both an art and a science dedicated to creating harmony and sustainability. This multidisciplinary field aims to craft aesthetically pleasing and culturally meaningful atmospheres through spatial planning, 造型设计, color coordination, and material application. Its diverse manifestations include interior design, which enhances comfort through 造型, lighting, materials, and color; large-scale sculptures that serve as iconic focal points conveying cultural themes through unique forms; murals that utilize wall spaces to tell stories and enliven architecture; and landscape installation art that combines natural and artificial materials to interact with surroundings and create novel visual effects. In cultural tourism projects, artistic design expressions can subtly integrate cultural elements to enhance visual impact, environmental comfort, and cultural perception.

Currently, in broadcasting and media projects, environmental art and acoustic science complement each other to form the unique field of acoustic architectural design. In cultural buildings and spaces such as large studios, immersive performance venues, traditional theaters, and concert halls, acoustic decoration, stage 美术, and professional lighting applications are essential.

1.3 Theoretical Basis and Interrelationship

The integration of broadcasting technology and environmental art is founded on cultural development needs. From a communication studies perspective, their fusion expands information dissemination channels and methods, enhancing cultural transmission effectiveness. In aesthetic theory, it integrates diverse aesthetic elements from traditional and digital art forms to create more attractive artistic spaces. In cultural research, it facilitates deep excavation and presentation of regional culture. The two domains are interdependent and mutually reinforcing: technology and equipment provide media and platforms for artistic display, while art offers rich materials and inspiration for technological applications.

2. Application Status in Cultural Tourism Projects

2.1 Successful Case Analysis

Case 1: The *Only Dream of Red Mansions· Drama Fantasy City* project centers on the classic novel *Dream of Red Mansions*, featuring four large indoor theaters, eight small indoor theaters, and over a hundred 情景 spaces and outdoor venues that integrate stage installation art and immersive technology, creating a dream-

like spatial artistic experience for visitors. Audio-visual technologies include multi-channel sound systems, projection mapping, and giant curved screens; 舞美 environments and spaces feature 情景 installations built along storylines to create immersive and realistic atmospheres; lighting design employs different lighting arrangements and variations to create mysterious and illusory story scenarios.

Case 2: Some ancient city cultural tourism projects have installed smart interactive screens at key attractions to display historical stories and architectural details. Simultaneously, they create characteristic landscape 小品 based on traditional architectural styles and stories, complemented by lighting art that evokes an antique ambiance. Visitors can deeply explore the city's culture through interactive screens, while landscape 小品 and lighting enhance environmental aesthetics and immersion, significantly boosting visitor interest and the city's cultural appeal.

Case 3: *Encounter· Harbin* draws inspiration from the Yangmingtan Bridge for its 舞美 design, constructing a unique stage on the Songhua River using barges. The large screen composed of vertical strip grille displays arranged at varying heights creates smooth curves resembling the river's rippling waves, establishing itself as a new landmark for the city's cultural tourism.

Case 4: Zhangjiajie Wulingyuan's "Natural Film Studio." With the popularity of the fantasy drama *Eternal Night Galaxy*, Zhangjiajie Wulingyuan, its filming location, has become a 热门 destination. Zhangjiajie's unique landscape provides excellent conditions for film and television productions. Post-production teams have created virtual scenes such as immortal sect pavilions that blend with natural conditions, combining virtual and real scenes through film and television post-production and special effects synthesis to present audiences with a realistic yet magnificent fantasy world. The drama's popularity has also served as an attractive invitation to viewers, significantly promoting local cultural tourism development.

2.2 Existing Problems

(1) Insufficient Content Innovation. Many cultural tourism projects fail to deeply explore local 特色 culture when integrating technology and art, lacking unique creative expression. Different regions' projects show high similarity in content presentation—for instance, some immersive light shows simply replicate popular special effects without integrating unique local history, folklore, or cultural elements, making it difficult to leave profound and distinctive memories for visitors.

(2) Lack of Differentiation in Technology Application. Some projects tend to imitate successful cases when adopting technologies, lacking innovative practices tailored to local conditions. In applications such as lighting effects and virtual imaging, they fail to fully consider site conditions and cultural 底

蕴, resulting in 千篇一律 presentations that cannot offer visitors refreshing experiences.

(3) Suboptimal Integration of Technology and Art. Some projects overemphasize technology 展示 while neglecting artistic connotation and expression, preventing organic fusion. For example, certain large-scale 实景 performances employ numerous advanced audio-visual technologies but suffer from hollow plots and uninspired performances, leaving visitors with only a sense of technological 堆砌 rather than genuine appreciation of local culture.

(4) High Operating Costs. Introducing advanced technology and art requires substantial investment in equipment procurement, technology research and development, and professional talent cultivation, with subsequent operation and maintenance costs also being considerable. For financially constrained projects, this heavy economic burden may become a major obstacle to sustainable operation.

(5) Visitor Demographics Causing Experience Disparities. Due to variations in age, aesthetic preferences, and acceptance of new technologies, visitor evaluations of such integrated projects differ significantly. For instance, elderly visitors may feel uncomfortable with overly complex special effects and immersive experiences, while younger visitors often find projects with low technical content and insufficient creativity boring.

3. Value of Integration for Cultural Tourism Projects

3.1 Enhancing Attractiveness and Competitiveness

Technology empowers artistic expression, breaks traditional boundaries, enriches work layers, and comprehensively enhances emotional interaction with visitors. Broadcasting technologies including lighting, sound, virtual reality (VR), augmented reality (AR), and special effects enable visitors to transcend reality and immerse themselves in historical scenes or fantasy worlds. For example, in museums, AR technology can "resurrect" cultural relics to tell their own stories, greatly stimulating visitors' exploratory desire. Environmental art creates unique landscapes and atmospheres—from giant sculptures to light and shadow art—projecting gorgeous virtual images onto real scenes to become iconic calling cards. Their synergy helps projects stand out, become more recognizable and attractive in the tourism market, draw more visitors, increase market share, and strengthen competitive advantages among similar projects.

3.2 Enriching Sensory Experience and Cultural Cognition

High-definition imaging, surround sound, and other audio-visual technologies vividly present cultural content. Spatial landscaping—whether ancient architectural decorations or modern art installations—provides tangible cultural carriers that can be touched and felt. Visitors moving through these spaces experience

visual impacts of colors and forms, auditory sensations of 特色 music and narration, tactile perceptions of environmental textures, and olfactory captures of cultural atmospheres. Simultaneously, the integration displays regional cultural details and historical contexts, broadening visitors' cultural horizons and deepening their understanding and cognition of local culture, transforming tourism into a journey of profound cultural learning and unforgettable memories.

3.3 Elevating Cultural Connotation and Artistic Quality

Technology facilitates multi-form dissemination of cultural stories, while film and television production can present cultural and historical events through vivid plots. As shown in Table 1 , artistic design integrates regional culture into spaces, from garden layouts to street art 小品, all following aesthetic principles. Their integration enables cultural tourism projects to present culture more systematically and deeply, with artistic expression becoming more innovative and infectious.

3.4 Empowering Long-term Development

The integration helps create unique regional cultural tourism IPs, attract more visitor traffic, and provide financial support for sustainable project operation. Simultaneously, it drives continuous iteration and upgrading of technology and artistic expression forms, enabling projects to maintain leading advantages in fierce market competition and achieve sustainable development.

4. Integration Strategies in Cultural Tourism Projects

4.1 Technical Level Strategies

Intelligent IoT Integration: Utilize IoT technology to interconnect broadcasting display and sensing devices with various facilities in the environment. In cultural tourism scenic areas, an intelligent control center can automatically regulate lighting, audio equipment, and landscape facilities based on time, visitor flow, and weather conditions, achieving energy efficiency and high-efficiency operation. Through high-definition live broadcasting and VR/AR immersive interaction within scenic areas, visitors can enjoy smooth, real-time experiences.

Customized Technology Adaptation: Tailor technology to the specific needs and site conditions of cultural tourism projects. For compact indoor venues, develop and adopt small, integrated projection and audio equipment that seamlessly blends into spatial layouts, overcoming space limitations while delivering high-quality audio-visual experiences. Promote high-definition image quality upgrades by vigorously introducing 4K and 8K ultra-high-definition imaging technologies in response to national policies, comprehensively upgrading the visual quality of cultural tourism content. For example, in documentary filming and scenic area live broadcasting, ultra-high-definition cameras capture every detail—such as the weathered traces of ancient temples or the dynamic

moments of rare flora and fauna—presenting natural and cultural landscapes with 极致 clear images.

Enhanced Intelligent Security Monitoring System: Integrate broadcasting high-definition video monitoring technology with intelligent security systems, employing AI image recognition and behavioral analysis algorithms to achieve comprehensive real-time monitoring and security 预警 for personnel and equipment in scenic areas. Facial recognition technology quickly identifies visitors to prevent them from getting lost or encountering abnormal situations; real-time monitoring of broadcasting equipment operation status enables timely detection and handling of fault hazards, ensuring scenic area safety and operation.

4.2 Environmental Art Level Strategies

Organic Integration of Biophilic Design: Incorporate biophilic design concepts into environmental art spaces to create vibrant cultural tourism atmospheres. For instance, in scenic area leisure zones, construct rest spaces centered on natural greenery, using dynamic lighting technology to simulate dappled sunlight through leaves in the morning or soft sunset glow in the evening. Combined with art seats and landscape 小品 incorporating natural elements, and professional equipment displaying natural science videos, visitors can relax while deepening their understanding and appreciation of ecological environments.

Dynamic Public Art Innovation and Interaction: Create public artworks capable of dynamic changes, utilizing broadcasting remote control technology and sensor networks to achieve deep interaction between artworks and visitors. In activity squares, install intelligent landscape features with multiple sensors that capture visitors' footsteps, voices, and body movements. Through remote control and sensor data, real-time adjustments to landscape morphology, lighting colors, and flashing rhythms bring the installations to life, greatly enhancing visitor participation.

Three-dimensional and Diverse Presentation of Cultural Symbols: Deeply excavate local 特色 cultural symbols and present cultural 底蕴 comprehensively through three-dimensional spatial layouts and diverse display technologies. In historical and cultural districts, present cultural symbols on building facades and ground pavements through reliefs and inlays. Simultaneously, using 3D projection and holographic imaging technologies, transform cultural symbols into dynamic historical scenes during specific festivals or times—such as bustling ancient trade markets or grand traditional folk celebrations—allowing visitors to immerse themselves in historical culture.

4.3 Content and Artistic Creation Level Strategies

Strengthen Team Collaboration and Co-creation: Attempt cross-generational collaborative creation models by building platforms that organize creators of different ages to jointly engage in cultural tourism content creation,

gathering diverse creative perspectives. Invite senior folk artists to share local historical 典故 and traditional handicraft processes, while young creators use digital animation, virtual reality, and other modern technologies for innovative adaptation. Encourage teenagers to contribute novel and interesting creative ideas to jointly create cultural tourism content integrating fun, educational value, and innovation.

Plan 实景 Performances to Promote Integration: Promote the fusion of diverse artistic elements with local culture through 实景 performances. The large-scale 实景 performance *Only Mount Emei* exemplifies this approach, using storylines and multiple stage landscapes to create a magnificent performance that attracts visitors and vividly displays regional history. Through plot elements such as dialogues between a disheartened young girl and an old man, the performance provides spiritual enlightenment and emotional comfort, offering visitors a new cultural and artistic experience through its healing and relaxing atmosphere.

Global Cultural Fusion Creation Practice: Break cultural barriers by actively inviting artists worldwide to participate in content creation. With the premise of building an international tourism city, organize artists from various countries to jointly create music performances, dance shows, and theatrical works that fuse multicultural elements around local unique cultural resources. Utilize online platforms to disseminate these splendid cultural feasts worldwide, attracting international tourists and promoting cultural exchange.

4.4 Operation Management Level Strategies

Build Integrated Operation Platforms: Unify management of equipment operation status, content playback schedules, landscape maintenance, and spatial usage arrangements. Real-time monitoring of equipment operation data enables timely fault handling and improves operational efficiency. Intelligent guided tours using positioning and mapping provide attraction information and voice explanations, recommend routes based on preferences, and display crowd density to help avoid peak times. Guided tour apps facilitate visitor itinerary planning, ensure orderly scenic area tours, and optimize visitor flow.

Big Data Analysis for Precise Marketing: Analyze big data on visitor age, geography, and interests to promote novel experiences for young visitors and wellness tours for elderly visitors. Based on consumption data, optimize pricing packages such as family 套票 discounts to enhance scenic area competitiveness and visitor conversion rates, precisely attracting target customers.

5. Support Measures

5.1 Policy and Regulatory Support

Government and development reform cultural departments have introduced relevant policies encouraging the integrated development of technology and art

in cultural tourism projects. In May 2024, the National Development and Reform Commission and other departments issued the *Implementation Plan for Promoting Equipment Renewal in Culture and Tourism* [1]. Additionally, special support funds have been established to finance innovative project research and practice, with tax incentives offered to cultural tourism enterprises that actively adopt new technologies and art forms with remarkable results. Industry standards and regulations have been formulated to ensure safe and reliable technology application and culturally appropriate artistic creation. Approval processes have been simplified with green channels opened for integrated projects to facilitate rapid implementation.

5.2 Professional Talent Cultivation

With era development and market demand, cultivating interdisciplinary talent is crucial. Universities should establish relevant specialized courses integrating broadcasting technology, environmental art, and cultural tourism knowledge, emphasizing practical teaching such as student participation in actual cultural tourism projects. Enterprises should strengthen training to keep technical personnel's skills and perspectives current, jointly building a talent pool with both theoretical knowledge and practical experience to support integrated development.

6. Future Outlook

Under the vigorous development of cultural tourism and continuous innovation in technology fields, future integration will expand in both depth and breadth. For instance, artificial intelligence and the Internet will enable intelligent perception and interaction in cultural tourism scenarios, such as automatically adjusting lighting effects. Content creation will emphasize cross-cultural fusion, drawing on global artistic essence. The integration also shows trends toward miniaturization and portability, allowing visitors to enjoy customized cultural experiences anytime, anywhere through portable devices, continuously expanding creative boundaries and diversifying forms.

This study analyzes the integration status of broadcasting technology and environmental art in cultural tourism projects. Although certain achievements have been made, limitations remain. Looking ahead, we must continue in-depth research, break existing bottlenecks, deepen integration, and propel the cultural tourism industry toward higher quality and more innovative development.

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Author Information: Ren Jiaxuan (1986—), female, from Datong, Shanxi, Bachelor's degree, Engineer, research focus on art design and acoustic decoration design related to media and broadcasting.

Responsible Editor: Li Yansong

Note: Figure translations are in progress. See original paper for figures.