Lecture Notes in Education, Arts, Management and Social Science,
2026, Volume 4, Issue 7
https://bbwpublisher.com/journal/LNE
Online ISSN: 2705-053X
Print ISSN: 3083-1091

Research on the Application of AIGC Tools in Modern Exhibition Space Scheme Design

Huawei Wu

Zhengzhou University of Science and Technology, Zhengzhou 450000, Henan, China

Copyright: © 2026 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: Driven by the continuous digital upgrading of smart exhibition industries and innovative development of digital tourism, Artificial Intelligence-Generated Content (AIGC) technology has emerged as a novel technical and creative support for modern exhibition space design. Featuring efficient content output, intelligent scenario deduction, and parametric design advantages, AIGC has broken the traditional creative limitations of the exhibition design industry. Taking the whole workflow of modern exhibition space scheme design as the main research framework, this paper categorizes the functional attributes of mainstream AIGC design tools and explores their practical application strategies in the full-cycle design process covering thematic planning, spatial layout planning, visual effect creation, and interactive scene design. By discussing the innovative significance and practical advantages of AIGC technology in exhibition space design, this study provides a solid theoretical basis and feasible practical references for the standardized, in-depth, and intelligent application of AIGC technology in the field of smart exhibition design.

Keywords: AIGC tools; Modern exhibition space; Spatial design; Digital design; Smart exhibition

Online publication: July 26, 2026

1. Introduction

Against the backdrop of deep integration between the digital economy and cultural and creative industries, modern exhibition carriers represented by museums, theme pavilions, art galleries, and commercial exhibition halls have undergone profound functional transformation. Different from traditional exhibition spaces that only focus on physical display and information presentation, contemporary exhibition venues emphasize immersive visitor experience, cultural story dissemination, and interactive scene construction, and have evolved into multi-functional comprehensive spatial carriers. Centering on the complete scheme design process of modern exhibition spaces, this paper systematically sorts out mainstream Artificial Intelligence-Generated Content (AIGC) design tools, clarifies their specific application scenarios and implementation methods in exhibition theme planning, spatial layout optimization, visual style creation, and interactive experience upgrading. Furthermore, it summarizes the core application value and existing limitations of AIGC technology, aiming to provide theoretical guidance for the digital innovation of exhibition space

design and promote the high-quality and intelligent development of the modern exhibition industry.

2. Functional classification of AIGC tools for modern exhibition design

2.1. Text generation tools

Text generation tools based on large-scale language models constitute the fundamental technical support for the early-stage planning of exhibition design. Equipped with powerful capabilities of natural language comprehension, autonomous content creation, logical framework sorting, and thematic content optimization, such tools undertake core text creation work in the initial design stage. In modern exhibition design, textual content serves as the spiritual core of the entire exhibition system, including thematic positioning, cultural narrative scripts, exhibition area logical planning, exhibit explanatory texts, design concept elaboration, and project proposal compilation, which fundamentally determine the cultural connotation and communication value of exhibition works. In practical design work, text generation AIGC tools can disassemble vague design demands into standardized, detailed, and executable design instructions, realizing structured sorting of design ideas. Such optimization effectively solves the problems of ambiguous logic and incomplete content in traditional manual planning, and provides unified and standardized textual support for subsequent spatial modeling, visual design, and interactive function development. It ensures the overall logical consistency and content integrity of the exhibition scheme, and greatly improves the efficiency and standardization of early exhibition planning.

2.2. Image visual generation tools

Image and visual generation tools based on diffusion models and computer vision technology are pivotal auxiliary tools for the visual design of exhibition spaces. These tools can generate high-precision effect renderings, stylized design materials, scene atmosphere pictures, and visual layout schemes according to text descriptions, hand-drawn sketches, and reference images, realizing rapid iteration of visual design results. The visual presentation effect of exhibition spaces directly determines visitors' intuitive viewing experience, covering multi-dimensional elements such as spatial atmosphere, color matching, layout form, decorative style, lighting effect, and material texture. Traditional exhibition visual design relies on manual sketching and software rendering, which is time-consuming, costly, and difficult to carry out multi-style trial creation. In contrast, AIGC visual generation tools can meet the differentiated design demands in different design stages. In the preliminary creative stage, they generate diversified thematic reference images to broaden designers' creative thinking; in the middle design stage, they automatically generate exhibition area renderings, wall visual schemes and lighting atmosphere effects based on determined spatial layout, replacing tedious manual rendering work; in the scheme optimization stage, they realize intelligent adjustment of color hierarchy, visual proportion and detail texture, providing multiple alternative visual versions for team comparison and optimal selection, so as to improve the refinement and diversity of visual design.

2.3. 3D spatial modeling and generation tools

3D spatial generation tools are core technical equipment for constructing digital exhibition space entities. Supported by 3D generation algorithms, parametric modeling, and spatial topology calculation technology, such tools realize rapid model construction, structural optimization, scene simulation, and spatial logic deduction of exhibition venues, thoroughly optimizing the inefficient working mode of traditional manual 3D

modeling. Modern exhibition space design puts forward strict requirements on spatial layout, structural scale, visitor flow line planning, and scene adaptability, and traditional manual modeling is prone to defects such as unreasonable space proportions, congested partial areas, and chaotic flow line design. AIGC 3D spatial tools can generate complete digital models of exhibition spaces based on text instructions, floor plans, and basic spatial frameworks, covering core elements such as overall spatial structure, exhibition area division, display facilities, decorative structures, and visitor flow lines. Combined with ergonomic principles, space utilization standards, and visitor viewing habits, the tools can intelligently optimize spatial scale and flow line layout, effectively avoid various spatial design defects in manual creation, and realize scientific, accurate, and efficient construction of exhibition space models.

3. Application path of AIGC technology in modern exhibition space scheme design

3.1. Thematic planning: Intelligent upgrading from theme definition to narrative system construction

As the initial link of exhibition space design, conceptual and thematic planning determines the overall creative direction and cultural connotation of the exhibition scheme. Its core tasks include defining exhibition themes, refining cultural core elements, building complete narrative frameworks, and clarifying design positioning. The intervention of AIGC technology has transformed the traditional single manual deduction mode into a multi-dimensional intelligent planning mode, realizing the innovative upgrading of exhibition conceptual design [1].

In the thematic positioning stage, text-based AIGC tools can conduct multi-angle creative derivation according to core cultural elements, exhibition attributes, display objects, and target visitor groups, outputting personalized and differentiated exhibition theme schemes, which breaks the homogenization problem of traditional fixed thematic design. In the narrative framework construction stage, AIGC tools can sort out systematic narrative logic around the determined exhibition theme and build a hierarchical and progressive exhibition story system. Following the logical sequence of "introduction guidance–core content display–in-depth detail interpretation–summary and spiritual sublimation," the tools can divide the functional positioning and content focus of each exhibition area, clarify the internal connection of each spatial module, and solve the common problems of scattered content, disjointed logic, and fragmented narrative in traditional exhibition design.

In addition, AIGC tools can automatically generate standardized planning documents, design concept descriptions, and exhibition area introduction texts, forming complete preliminary planning results. These systematic achievements provide clear guidance for subsequent spatial construction, visual creation, and content filling, and promote the standardization, refinement, and intellectualization of exhibition conceptual planning.

3.2. Spatial design: Efficient iteration from layout optimization to intelligent scene generation

Spatial design is the core part of modern exhibition scheme design, which covers overall venue layout, functional area division, visitor flow line planning, display structure design, spatial scale control, and scene atmosphere creation, directly affecting the functional practicality and visitor spatial experience of the exhibition. The combination of AIGC 3D generation technology and parametric design has realized the

intelligent and precise upgrading of traditional exhibition spatial design [2].

In terms of layout optimization, AIGC tools can conduct algorithm simulation based on the inherent structure of the exhibition hall, the volume of display content, and visitor movement rules. By simulating multiple layout schemes, the tools can screen out the optimal spatial allocation mode, reasonably divide core exhibition areas, transition buffer areas, rest service areas, and interactive experience areas, and balance the spatial scale and functional proportion of each module to ensure the rationality of the overall layout. In terms of scene generation, based on the optimized layout scheme, AIGC 3D tools can quickly generate full-scale digital scenes of exhibition spaces, automatically complete the layout and construction of display cabinets, exhibition stands, decorative facilities, and partition structures, and simulate spatial lighting, scale proportion, and overall scene atmosphere. For different types of exhibitions such as immersive experience exhibitions, technology-themed exhibitions, and intangible cultural heritage exhibitions, the tools can adapt to differentiated spatial styles and atmospheric tones, generate multiple versions of spatial design schemes, and support designers in detailed adjustment and optimal selection, greatly improving the efficiency and diversity of spatial scene design [3].

3.3. Visual design: Innovative creation from style exploration to detail refinement

Visual design is a key carrier of exhibition theme expression, atmosphere creation, and information transmission, covering color system planning, lighting atmosphere design, wall visual design, layout matching, material selection, and decorative detail optimization. The overall visual effect is directly related to the audience's aesthetic experience and the overall texture of the exhibition. AIGC visual generation tools have realized full-process empowerment for exhibition visual design, covering innovative style exploration and fine detail optimization [4].

In the preliminary style exploration stage, AIGC image generation tools can deduce diversified visual styles according to the exhibition's cultural attributes and thematic connotation. For traditional cultural exhibitions, it can generate elegant Chinese-style and retro aesthetic visual schemes; for science and technology exhibitions, it can create futuristic, minimalist, and cyber-style visual effects; for art exhibitions, it can output abstract and personalized immersive visual styles, effectively breaking the stylized and homogenized limitations of traditional visual design and expanding the boundary of creative expression. In the subsequent detail-deepening stage, AIGC tools realize unified optimization of the overall visual system. On the one hand, it unifies the color tone, lighting hierarchy, and material texture of each exhibition area, avoiding visual chaos and style disjointing; on the other hand, it carries out intelligent design for micro visual elements such as wall posters, exhibit labels, navigation systems, and light and shadow details, effectively improving the refinement, completeness, and integral coordination of the exhibition visual system.

3.4. Interactive experience design: Comprehensive upgrade from static display to intelligent dynamic participation

With the continuous upgrading of public aesthetic and experience demands, modern exhibitions have completely broken the traditional single static display mode, and immersive, interactive, and experiential exhibition forms have become the mainstream development trend of the industry. The level of interactive experience design directly determines the attraction, communication power, and audience stickiness of the exhibition. The integration of AIGC technology and digital interactive technology promotes the comprehensive transformation of exhibition experience from passive static viewing to active intelligent

participation [5].

Relying on the natural language interaction capability of large models, AIGC builds intelligent explanation and real-time Q&A systems for exhibitions. Different from traditional fixed voice broadcasting and manual explanation, the AIGC intelligent explanation system can dynamically adjust explanation content, language style, and knowledge depth according to visitors' age characteristics, interest preferences, and knowledge background, providing personalized and customized viewing guidance services for different audiences.

In terms of scene interaction, combined with 3D real-time rendering technology, AIGC can create dynamic, immersive, interactive scenes, realize virtual restoration of cultural relics, reproduction of historical scenes and dynamic interpretation of cultural connotations, and transform static exhibit information and cultural resources into vivid audio-visual interactive scenes, which significantly enhances the immersion and appeal of the exhibition. Meanwhile, AIGC can collect and analyze audience viewing behavior data and experience feedback, continuously optimize interactive logic and update display content, realize dynamic iteration of exhibition interactive experience, and build an intelligent, personalized, and immersive modern exhibition interactive system.

4. Case analysis of AIGC technology applied in exhibition scheme design

4.1. Museum cultural exhibition case

The Digital Experience Hall of Ancient Beiguo Great Wall Castle in Miyun, Beijing, is a typical practical case of AIGC empowering museum digital exhibitions. Officially opened to the public in November 2025, the project covers three major Great Wall castle groups including Guibao, Yaoqiao Yu, and Guanmen. The core exhibition item "Time Gate" adopts AIGC technology to activate static historical old photos, converting flat historical materials into vivid dynamic scene videos. In addition, the project develops an intelligent digital person based on the image of national hero Qi Jiguang, which can conduct real-time interactive communication with visitors and interpret the historical stories of border defense and castle construction in a personalized manner. Based on the sorting of ancient documents, historical maps, and cultural materials, the project integrates AIGC digital technology and AR augmented reality technology to carry out innovative digital activation and display creation for the 182.97-kilometer Ming Great Wall and 61 castle cultural resources in Miyun District. It builds a comprehensive multi-functional exhibition space integrating heritage education, science popularization display, and cultural tourism experience, creating a new digital development paradigm for the protection, inheritance, and innovative utilization of Great Wall cultural heritage.

4.2. Thematic smart exhibition case

The AI Smart Special Exhibition Hall of Anhui Museum represents an innovative practice of full-scene AIGC application in domestic thematic exhibitions. Co-built by Anhui Unicom, Anhui Museum, and Unicom Wo Music Company, this exhibition hall is the first special smart exhibition hall built in national-level museums in China. Equipped with a naked-eye 3D Chu-style luminous theater, it provides audiences with an ultra-high-dimensional, fully immersive viewing experience. Meanwhile, the online VR cloud exhibition project of Anhui Museum combines AI digital human technology and large model algorithms to create a new mode

of online cultural dissemination. The independently developed AI Time Gate interactive device realizes the personalized anthropomorphic interaction of cultural relics, and can quickly generate Chinese-style cultural and creative photos for visitors within 10 seconds, realizing the integration of exhibition experience and cultural and creative output. The project applies AIGC technology throughout the whole cycle of pre-exhibition promotion, in-exhibition experience optimization, and post-exhibition content dissemination. After the completion of the first-phase construction, the average staying time of visitors increased by 53%, and its mature operation model has been promoted and replicated nationwide, providing a valuable practical demonstration for the digital transformation and intelligent upgrading of domestic museums.

4.3. Cultural and art exhibition case

In a traditional lacquer art cultural exhibition project focusing on 18th-century Guangzhou port culture and maritime trade history, the design team took AIGC tools as the core auxiliary creation means. The designers used text and image generation tools to convert massive literary materials about ancient Guangzhou port scenes, merchant ship features, and lacquer art craftsmanship into intuitive conceptual effect drawings, and completed stylized previews and optimized complex lacquerware decorative patterns. The team carried out an ultra-high-precision digital collection of core exhibits, built a structured cultural knowledge graph, and realized labeled and associated sorting of lacquerware production techniques, pattern cultural connotations, and Sino-Western cultural integration characteristics. Relying on accurate literature data and microscopic image information, AIGC technology enables the dynamic restoration of flat lacquerware patterns, converting static plane patterns into real-time 3D dynamic animations. The vivid dynamic interpretation effectively reproduces the development history of Chinese lacquer art's overseas communication and cross-cultural dissemination. This practice fully verifies the efficient empowerment value of AIGC technology in improving the quality and efficiency of cultural exhibition design, and provides a new innovative path for the modern dissemination and creative inheritance of traditional Chinese excellent culture.

5. Conclusion

This paper systematically studies the functional classification and full-cycle application strategies of AIGC tools in modern exhibition space design, and clarifies the internal logic and core value of AIGC technology empowering the digital innovation of exhibition design. Text generation, visual image generation, and 3D spatial generation AIGC tools are accurately matched with the core links of exhibition conceptual planning, visual creation, and spatial construction, respectively, forming a complete intelligent design system covering the whole process of exhibition scheme design. At present, the application of AIGC technology in the exhibition design industry is still in the exploratory development stage, and there are still practical problems such as homogeneous creative results, insufficient detail precision, and shallow exploration of cultural connotations. AIGC technology serves as an efficient auxiliary tool rather than a substitute for designer creativity. Only by combining technological advantages with designers' professional aesthetic literacy, cultural cognition, and practical design experience can we realize the organic integration of technological empowerment and humanistic creativity. With the continuous iteration and upgrading of AIGC algorithms and technologies, its application in exhibition space design will be more refined, professional, and standardized. In the future, AIGC will further promote the intelligent transformation and high-quality development of the modern smart exhibition industry, and inject continuous innovative vitality into the

digital inheritance and creative presentation of cultural resources.

Disclosure statement

The author declares no conflict of interest.

References

[1] Liang KZ, Jiang TJ, Zhang H, 2025, Research on the Implementation Path of AIGC Enabling the Exhibition Space Design of Jinggangshan Red Culture. Hunan Packaging, 40(6): 99–103.

[2] Yang QQ, 2025, Research on the Optimization Method of Exhibition Space Layout for Intangible Cultural Heritage of Qinhuai Lantern Festival under Digital Narrative Theory. Masterpieces and Famous Works, (36): 125–128.

[3] Liu YQ, 2025, Research on the Application of VR Technology in the Exhibition Space Design of Xi'an Qujiang Agricultural Expo Park, thesis, Jiangxi University of Science and Technology.

[4] Yu XL, 2025, Research on Exhibition Space Design Based on Generative Artificial Intelligence, thesis, Guangdong University of Technology.

[5] Zhang Y, Yu YX, 2025, Research on Interactive Design of Exhibition Space in the Digital Era. Beauty and Times (Urban Edition), (2): 107–109.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.