

Digital Transformation of the Cultural Industry: Technology Empowerment, Attributes Reconfiguration, and Development Strategies

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Abstract: Digital technology is reshaping the cultural sector in ways we've never seen before. The technology has penetrated every domain of this industry and pushes digital change to the top of its development agenda. We demonstrate that the core of digital transformation can be captured in three key dimensions: the data-enabled democratization of cultural creativity, cross-ecosystem collaboration made possible by broken industrial boundaries, and the nonlinear diffusion of cultural value under the experience economy. Building on this conceptual framework, this paper systematically analyzes how core enabling technologies including artificial intelligence, big data, extended reality (XR) and blockchain are reshaping and disrupting each segment of the cultural industry value chain. Finally, we put forward the strategic development framework with the goals of nurturing innovation, upholding industrial equity and unlocking developmental potential.

Keywords: Cultural Industry; Digital Transformation; Digital Technology; Digital Cultural Ecosystem

1. Introduction: from "Digital Survival" to "Digital Prosperity"

Ever since Nicholas Negroponte foresaw the rise of "digital existence", digital technology has graduated from a peripheral supporting tool for the cultural industry to its foundational infrastructure and core growth driver. In its Culture Times: Global Report on the Cultural and Creative Industries, UNESCO emphasizes that digital technology constitutes the core driving force behind promoting cultural diversity, expanding public cultural participation, and generating new economic value (UNESCO, 2021).

That said, existing research and industrial

practice have often fallen into the binary opposition between "technological determinism" and the "content-first" doctrine, failing to unpack the underlying operational mechanisms of the transformation. We suggest that the digital transformation of the cultural industry is in the digital reconstruction of cultural ontology, the paradigm shift in industrial organization, and a fundamental transformation in value creation pathways.

2. Reconstructing Essential Attributes: Three Core Transformations Beyond Instrumentalization

2.1 Production Logic: From Professional Monopoly to Data-Driven Democratization of Creativity

Traditional cultural production relies heavily on specialized institutions, elite creators, and limited physical media carriers such as film stock and printing paper, which create high entry barriers that sustained long-term professional monopoly. Digital transformation has broken this traditional production paradigm completely. To start with, the blending of UGC (user-generated content) and PGC (professionally-generated content) gives consumers the opportunity to act as content producers at the same time. Typical examples include creative re-creations on short-video platforms, fan-created derivative stories, and open-source game modifications, all of which have greatly expanded the source pool of cultural content. Existing research has verified that the willingness of producers and consumers to carry out value co-creation has a significant positive impact on the commercial performance of cultural organizations, and digital media plays a clear positive moderating role in this relationship (Chatterjee et al. 2023).

In addition, data has become the core production factor of modern cultural creation. Algorithms analyze content completion rates, sharing data

and other indicators across different content types, to predict which topics have greater market potential. Technology platforms build DCM-UP user portraits and calculate DCM-US user similarity to achieve personalized video recommendation, and use user viewing time as a continuous indicator to measure users' in-depth participation in content (Alqazzaz et al., 2025). The rise of AI creative tools for writing, painting and music creation has realized partial automation of the creative process, which has triggered new academic discussions on "author identity" and "the nature of creativity" (Park, 2026; Tsao et al., 2025). The fundamental change of production logic is that creativity has changed from an inspiration-based "black box" process to a data-driven production system with the characteristics of analyzability, optimizability and open crowd-sourcing.

2.2 Organizational Structure: From Linear Value Chain to Ecologically Collaborative Boundary Absorption

The traditional cultural industry operates along a rigid, linear value chain that moves sequentially from creative development to physical production, distribution and final consumption. In the digital era, this rigid structure has been deconstructed and reconfigured into a dynamic, open, networked digital ecosystem. Digital platform giants including YouTube and Spotify act as core hubs that connect creators, audiences, advertisers and technology service providers across multiple segmented markets, while also playing dual roles as ecosystem governors and cultural agenda-setters (Poell et al., 2025). Within this emerging ecosystem, traditional organizational boundaries are becoming increasingly fluid: large global technology firms such as Apple, Google and Byte Dance have deepened their engagement in original content production, while legacy cultural incumbents including Disney have invested heavily in building self-operated streaming platforms and digital technology infrastructure. This two-way penetration has given rise to integrated "tech-culture-entertainment" ecosystems that blur traditional sectoral divides.

Beyond boundary blurring, cross-sector collaborative innovation has become the industry norm. A hit intellectual property (IP) can be simultaneously developed across films, video games, animation and offline immersive experience venues, with interconnected user data,

shared fan communities and coordinated marketing campaigns across all touchpoints. This integrated development model, which has been conceptualized as a "galactic" synergy model (Jenkins, Ford, & Green, 2013), far exceeds the value potential of single-sector development.

2.3 Value Logic: Nonlinear Value Multiplication from Product Transactions to Experience-Centered Creation

The value of traditional cultural products is primarily captured through one-time sales transactions (for physical goods such as books and vinyl records) or bounded access rights (such as single-usage movie tickets). Digital transformation has reoriented cultural industry value logic from "ownership of physical goods" to "access to digital content" and immersive user experience. Subscription-based models (exemplified by Netflix) and tiered membership systems have become the dominant revenue models in digital cultural sectors. This model converts volatile one-time revenue into stable, recurring cash flow, with core value defined by long-term user stickiness and customer lifetime value (LTV) (Iyengar, Park & Yu, 2022), where stickiness forms the operational foundation and LTV serves as the core performance metric.

In addition, the experiential value unlocked by digital transformation has far outstripped the functional value of traditional cultural products. Common digital cultural consumption behaviors-including the purchase of in-game cosmetic skins, virtual gifting on live streaming platforms, and tickets to virtual idol concerts are priced entirely on the basis of experiential attributes: emotional connection, group identity, and social capital, which are fully decoupled from the marginal physical cost of provision. Guo & Chen (2025) demonstrate that in digital cultural and creative consumption, emotional value and cultural identity exert a far stronger direct effect on purchase intention than functional value, while functional value only influences consumer decisions through indirect pathways, with the user's immersive experience acting as the core mediating variable.

3. Empowerment via Core Technologies and Reshaping of the Cultural Industry Value Chain

3.1 Artificial Intelligence: Accelerating and

Expanding the Creative Process

Creative Generation: large generative AI models such as the GPT series are already widely applied in script writing, first-draft generation, visual concept generation, and music arrangement, improving creative efficiency while exploring new artistic styles (Manovich, 2020). Meanwhile, AI has become a creative tool for artists, which significantly expands the boundaries of artistic possibilities by generating inspiration, producing materials, and refining sketches.

Personalized Content Recommendation: AI-driven recommendation algorithms lie at the heart of modern digital content platforms. Using collaborative filtering, deep learning and other advanced algorithms, these systems deliver content tailored to users' preferences. Zielnicki et al. (2025) contend that research on Netflix illustrates that advanced personalized distribution tools are crucial for boosting users' activity and preserving diverse content.

3.2 Big Data: The "Neural Center" for Audience Insights and Decision-Making

User Insights and Dynamic Content Optimization: Digital technologies continuously collect detailed user behavioral data, including viewing time, completion rates and interaction patterns, and then analyze this data to uncover audiences' underlying cultural interests and unmet needs. It allows content creators to develop cultural works that leverage artistic quality and commercial value. Netflix serves as a typical example. Over 700 mathematicians and engineers perform daily analysis. The datasets cover more than 30 million playback events, 4 million user ratings, and 3 million search requests sourced from its 200 million-plus global users. This makes Netflix pinpoints audiences preferences and expectations, and develops original programming with strong market prospects (The Paper, 2020).

The "Revitalization" of Cultural Heritage: For damaged or lost cultural heritage sites, virtual reality (VR) technology can create their highly accurate virtual reconstruction through integrating archaeological records with historical documents. For instance, Zhu et al. (2023) applied machine learning and temporal sequence analysis to examine these data from the murals of Dunhuang Mogao Grottoes. Their work revealed cross-cultural evolution patterns in artistic styles along the Silk Road over a

thousand years, thereby putting forward data-supported hypotheses for the art historical research.

3.3 Extended Reality (XR) and the Metaverse: Reconstructing Cultural Spaces and Economies

Immersive Experience of 'New Theater' : XR technologies (VR/AR/MR) with the meta-verse concept are extending cultural experiences from two-dimensional screens to immersive three-dimensional environments, and reshaping performance art in fundamental ways. Virtual concerts and digitally re-imagined immersive productions such as 'Sleep No More' have grown increasingly popular. They deliver engagement and sensory presence, which were previously impossible in traditional venues.

Endogenous Cultural Production within the Metaverse: Virtual real estate, digital collectibles (NFTs), virtual identities (Avatars), and their social interactions are giving rise to a new paradigm for cultural creation and consumption, with their endogenous economic system and community governance structures. Brahmstaedt (2025) pointed out that the binding of virtual identities to NFTs establishes a quantifiable framework for social capital; within this framework, community interactions drive both identity value and asset valuation and built an endogenous social-economic model.

4. Development Strategy: Building a Future-Oriented Digital Cultural Ecosystem

4.1 Modernizing Regulatory Frameworks to Balance Innovation and Oversight

A prevailing narrative in both industry and policy circles holds that robust stringent regulation inherently stifles innovation. Bradford's (2024) research contend this conventional view, arguing that the perceived trade-off between digital regulation and innovation is a "false choice" -the central dilemma is not whether to regulate, but how to regulate effectively. Consequently, policymakers should concentrate on how to design effective regulatory frameworks for the digital age. For instance, they urgently need to amend the copyright law to clarify the ownership of AI-generated content (Zhang et al., 2025). In terms of regulatory practice, the core principle of "agile governance" should be adopted, employing flexible mechanisms like regulatory

sandboxes to dynamically identify and mitigate potential social and economic risks. These measures is to maintain a sustainable balance between encouraging technological innovation and ensuring public and economic benefits (Odong, 2026; Flew, 2021).

4.2 Promoting Cross-border Integration and Cluster Development

The inherently integration of digital technology have spurred new business models, from streaming music platforms and gaming ecosystems to digital publishing. Regions, which have been similar stages of digital development, are well-positioned to establish a unified digital cultural market and cross-regional collaborative network. In Western European, some countries sharing comparable digitalization stages have nurtured distinct digital media clusters. A prominent case is the "Brighton Cluster (UK)," where close collaboration between local universities and industry is to solve shared technological issues and cultivate innovative "hybrid firms" (Snowball, Tarentaal & Sapsed, 2022). These pioneering firms play a critical leadership role in driving coordinated growth among small and medium-sized enterprises along the industrial chain. They jointly build open-source platforms, share testing infrastructure, and promote mutual standard recognition and interface interoperability. This approach enhances the efficiency of social division of labor division and collaboration, while making the entire industrial ecosystem more open and resilient.

4.3 Actively Deploying Frontier Technologies and Exploring New Business Models

The future competitiveness of cultural industries be determined by the strategic depth and foresight of their investments in these frontier technologies. On one hand, we need to concentrate on exploring the application of technologies like block-chain, next-generation networks, and meta-verse architectures, while promoting the deployment of 5G, AR/VR, and AI from digital publishing, ultra-high-definition media to cloud gaming. On the other hand, we should accelerate the growth of new business models, including immersive performances, AIGC platforms, digital human live streaming, and virtual idol management. These new models need integrate with traditional cultural industries to establish

commercially viable and scalable pathways for growth. For instance, "Digital Silk Road" use digital twin technology to create high-precision 3D restoration and dynamic interactive displays of cultural heritage sites, including the murals of the Dunhuang Mogao Grottoes.

5. Conclusion and Prospects

Digital transformation is a profound paradigm revolution. Three key transitions stand out: production has changed from closed systems to open collaboration; organizations have reconfigured from linear chains into networked ecosystems, and the core value is centered around immersive interaction instead of one-way transactions. While this transformation has sparked tremendous innovation and new growth opportunities, it has also posed tough problems, including widespread algorithmic bias, intricate copyright disputes, and the threat of cultural diversity.

Moving forward, the cultural industry's development will need policymakers, industry leaders, and creators to work together, constructing a new digital cultural ecosystem that is efficient, vibrant, fair and inclusive.

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