

The Construction of an Innovative Ecosystem for the Cultural and Creative Industry Driven by the Digital Economy

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Abstract. In the context where the digital economy has become the core driving force for economic growth, the cultural and creative industries are encountering new opportunities and challenges for digital transformation. Based on the three-dimensional theoretical framework of "technology integration-driven - business model upgrading and evolution - innovation ecosystem synergy", this article systematically explores the innovative paths of the cultural and creative industries driven by the digital economy. Through case analyses, it is discovered that technology integration promotes the digital translation of cultural heritage via physical adaptation and symbolic reconstruction; business model upgrading reconstructs the cultural production value chain by relying on digitalized resources, decoupling of intellectual property (IP), and ecological feedback; and the user participation path activates the democratization process of cultural innovation. The study puts forward countermeasures to deal with the challenges of copyright protection and the urban-rural digital divide, maintaining that only in the dynamic balance of technological innovation and humanistic values can the cultural and creative industries achieve sustainable and high-quality development. This research provides a theoretical framework and practical path for resolving the contradiction between cultural protection and commercial development and facilitating the modern transformation of traditional culture.

Keywords: Digital Economy, Cultural and Creative Industries, Technology Integration, Business Model Upgrading, Innovation Ecosystem.

1. Introduction

Currently, the digital economy has emerged as the core driving force for China's economic growth. As revealed by the authoritative research report issued by the Zhongshang Industry Research Institute, in 2018, the scale of China's digital economy reached an astounding 31.3 trillion yuan, constituting 34.8% of China's Gross Domestic Product (GDP), and contributing a proportion of 67.9% to the growth of GDP. Undoubtedly, it has become an indispensable key pillar within the national economic system [1]. In the policy documents of the 20th National Congress of the Communist Party of China, the urgency of "promoting the national cultural digitization strategy" was explicitly stated, highlighting the core position and profound influence of digitization in facilitating the transformation and upgrading of the cultural industry [2]. With the deep penetration and extensive application of emerging technologies such as mobile Internet, big data technology, cloud computing platforms, and the Internet of Things, the cultural and creative industry is gradually advancing towards digitalization, mobilization, scenarization, and experientialization, ushering in a new era of profound integration of "culture + technology" [3, 4]. In this context, a series of novel business forms have emerged in the domain of China's cultural and creative sector. Cultural crowdfunding, Internet-based cultural finance and art finance, cultural trade and cross-border e-commerce, online dramas and online feature films, WeChat official accounts, etc., all exhibit unprecedented innovative vigor and development potential [5]. Nevertheless, deep-seated contradictions, such as the expanding gap in cultural consumption between urban and rural areas and the predicament in confirming digital copyright, persist. Hence, exploring the innovative and collaborative pathways between the digital economy and the cultural and creative industry is not only a strategic choice in response to the reconfiguration of the global cultural trade landscape but also an inevitable requirement for the digital inheritance of Chinese culture.

This study focuses on the innovative paths of the cultural and creative industry driven by the digital economy. Based on a three-dimensional theoretical framework encompassing technology integration-driven, business form upgrading and evolution, and innovative ecosystem collaboration, it systematically investigates the innovative development model of the cultural and creative industry within the backdrop of the digital economy. The research objectives encompass: (1) deconstructing the embedding logic of digital technology in cultural production scenarios; (2) uncovering the laws of industrial chain reconfiguration during the digital transformation process; (3) revealing the innovative paths through case studies; (4) discussing the current challenges and proposing corresponding countermeasures and suggestions.

This article will adhere to the logical approach of "theoretical construction - path verification - countermeasure research" and is divided into six sections: The first section is the introduction; the second section is the literature review; the third section is the theoretical model; the fourth section is the case analysis of the three major innovative paths; the fifth section is the current challenges and countermeasures; the sixth section is the conclusion, summarizing the research findings and looking forward to future research directions.

2. Literature Review

In the Chinese academic community, the cognition of the cultural and creative industry has formed a research paradigm oriented towards technology empowerment. Wang Bo and Zhang Gang define it as "an industrial form that relies on digital technology, network technology, and mass communication technology, takes creative resources as the foundation, and realizes the creation and dissemination of cultural value through digital and networked production methods" [6]. Current Chinese research focuses on the "technology - industry - policy" synergy mechanism and has achieved breakthroughs in areas such as blockchain copyright confirmation and AI-based cultural relic restoration. However, the problem of regional imbalance is prominent - according to the 2024 data from the National Bureau of Statistics, in 2023, among the operating incomes of large-scale cultural and related industries enterprises across the country, the eastern region accounted for approximately 78.2%, while the central and western regions combined accounted for approximately 20.9%. This reflects the mismatch between technology application and regional resource endowments.

International research presents differentiated perspectives: The EU has established a platform classification obligation system through the Digital Services Act to reduce misleading information and enhance public awareness of the role of AI in content creation. The "digital cultural sovereignty" theory proposed by the American academic circle advocates resisting the impact of cultural globalization through technical standards. Notably, the ethical controversies sparked by AI-generated content (AIGC) technology have become a global focus. For example, in 2024, major music companies such as Universal Music, Warner Music, and Sony Music in the United States filed lawsuits against AI music generation platforms, accusing them of training AI models without authorization using copyrighted music works, exposing the deep-seated contradictions between technological dividends and information privacy, as well as cultural protection [7].

Existing studies mostly analyze from a single dimension. Technological analysis is divorced from the characteristics of cultural carriers and lacks an integrated discussion of the "technology - industry - ecology" synergy mechanism. This research aims to address the fragmented shortcomings of traditional research by constructing a three-dimensional theoretical framework, providing a systematic analytical tool for solving problems such as insufficient technological adaptability and industrial chain discontinuities.

3. Theoretical Framework

3.1. Theory of Technology Convergence-driven Development

The convergence of technology and culture lies at the core of industrial upgrading, and the combination of content and digital technology serves as the key driving force for the development of the industry [8]. With the innovation in cultural supply and the iterative upgrading of digital technology, the cultural industry has gradually manifested new development characteristics and formed a new cross-border integration trend in multiple fields [9]. The digital integration of the cultural and creative industry adheres to the "Technology-Culture Adaptation Model", demanding a seamless connection throughout the entire process from data collection to value transformation. Its theoretical core encompasses two dimensions:

(1) Physical Dimension Adaptation: The application of digital technology must respect the material attributes of cultural carriers. For instance, due to the fragility of fibers, low-dose computerized tomography (CT) scanning should be employed for textile cultural relics, while the digitization of bronze wares relies on high-precision spectral analysis to prevent the loss of cultural details caused by improper scanning parameters.

(2) Symbolic Dimension Reconstruction: Technology needs to parse the deep semantics of cultural symbols through algorithms. For example, natural language processing (NLP) technology can extract the imagery network from ancient books, construct a computable cultural gene pool, and achieve the modern translation of traditional cultural elements.

3.2. Theory of Business Format Upgrading and Evolution

The essence of business format upgrading is to shatter the linear logic of traditional cultural production via digitalization and construct a dynamic network of "resources - IP - ecosystem". Its evolutionary path encompasses three-stage breakthroughs:

(1) Digitalization of resources: Transform physical cultural resources into editable digital assets through techniques such as 8K modeling and motion capture. During this process, high-resolution 8K modeling technology can precisely replicate the details of cultural heritage, while motion capture technology enables the dynamic display of static cultural relics.

(2) Decoupling of IP symbols: Disassemble cultural elements into symbol units capable of cross-media dissemination. For example, the Palace Museum has digitized the patterns on its cultural relics, covering over 300 pattern themes, generating editable digital assets and classifying and authorizing them through a database [10]. These digital assets can not only be utilized for academic research but also offer material support for cultural and creative enterprises, thereby shortening the development cycle of cultural and creative derivatives.

(3) Feedback mechanism of the ecosystem: User-generated content (UGC) is filtered by algorithms and fed back into the IP entity. The real-time bullet screen interaction of "National Treasures" on Bilibili achieved overnight popularity, with a significant increase in the quantity and views of user-generated videos, prolonging the IP's life cycle. This validates the applicability of the "co-creation theory" in the digital cultural domain - users are not merely consumers but also co-creators of value [11].

3.3. Innovation Ecosystem Synergy Theory

The synergy mechanism of the digital cultural and creative ecosystem is framed by the "Triple Helix Model" [12]. This model considers policy, technology, and market as the three core elements within the innovation ecosystem. Through the interaction and integration of these three elements, it propels the sustainable development of the digital cultural and creative industry.

(1) Institutional Driving at the Policy Level: Policy delineates the boundaries of innovation via technical standards, providing institutional guarantees and development directions for the digital cultural and creative industry. For example, in the "14th Five-Year Plan for the Development of the Cultural Industry" issued in June 2021, it was explicitly stated to implement the digitalization strategy

for the cultural industry, promote the "cloud, data, and intelligence" transformation and the integration of online and offline in the cultural industry, and accelerate the transformation and upgrading of the cultural industry [13].

(2) Responsive Adaptation at the Technology Level: As the core driving force of the digital cultural and creative ecosystem, technology needs to dynamically align with policy goals and social demands. According to the "2021 Douyin Intangible Cultural Heritage Data Report" by ByteDance, Douyin's "Intangible Cultural Heritage Partnership Program" has driven more than 5,000 people to be employed in the intangible cultural heritage sector in Dongyang, Zhejiang Province alone through regional tag recognition technology, demonstrating that technological tools can precisely activate regional cultural vitality.

(3) Feedback Regulation at the Market Level: User behavior data constitutes the core indicators for ecosystem optimization, and market feedback can guide the adjustments of policies and technologies. For instance, the "Digital Cultural Project Efficiency Radar Chart" in Suzhou Industrial Park has increased the weight of social benefits, compelling enterprises to optimize their technical solutions, thereby forming a closed-loop mechanism of "data feedback - strategy adjustment - value enhancement".

4. Case Analysis of Innovation Paths

4.1. Technology Integration-driven Path

This study takes the "Digital Bay Area" Cultural Data Service Platform in Shenzhen as an example to analyze the technology integration-driven path. As a pioneering demonstration area for the national cultural digitalization strategy, Shenzhen has constructed a novel paradigm for the protection and innovative application of cultural heritage via the "Digital Bay Area" Cultural Data Service Platform. The platform employs high-precision laser scanning, AI modeling, and blockchain technology to systematically digitize the cultural heritage of the Guangdong-Hong Kong-Macao Greater Bay Area. It possesses a certain proportion of overseas users and has emerged as an important vehicle for cultural export.

4.1.1. Physical dimension adaptation: precise protection and trustworthy circulation of cultural heritage

In the physical dimension, the platform forms a profound coupling between its technical characteristics and the material attributes of cultural carriers. For the abundant cultural heritage in the Greater Bay Area, the platform utilizes laser scanning and digital twin technology to create 1:1 model of traditional Lingnan architecture, circumventing the physical damage risks to fragile cultural relics caused by traditional mapping. It also establishes a trustworthy environment throughout the entire process of "creation - certification - transaction", generating a unique hash value for each digital asset to ensure the integrity of cultural resources. Additionally, the platform opens the application programming interface (API) of the digital asset library, enabling cultural and creative enterprises and academic institutions to invoke it as needed, providing a basis for the multi-scenario reuse of cultural resources.

4.1.2. Symbolic dimension reconstruction: algorithmic analysis and modern expression of cultural genes

In the symbolic dimension, the platform facilitates the semantic reconstruction and value extension of cultural symbols through technological innovation. For instance, it digitizes intangible cultural heritages such as the Shatoujiao Fish Lantern Dance using AI technology, creating interactive "digital cultural twins". Simultaneously, the platform leverages natural language processing (NLP) technology to extract the image associations in classics and local chronicles, forming a computable cultural knowledge graph to offer semantic support. This reconstruction in the symbolic dimension

not only realizes the modern translation of traditional cultural elements but also promotes the dissemination of cultural symbols in multiple fields and contexts.

The "Digital Bay Area" Cultural Data Service Platform in Shenzhen validates the dual logic of the "Technology-Cultural Adaptation Model". Nevertheless, it is essential to note that excessive modularization might lead to the fragmentation of symbols - tourists are more concerned with "taking photos and checking in" rather than the overall aesthetic value of the buildings. Benjamin pointed out in "The Work of Art in the Age of Mechanical Reproduction": "Technological reproduction liberates art from the shackles of traditional rituals, but also deprives it of its 'aura' - that unique quality within a specific time and space [14]." Although digital technology bestows cultural heritage with the ability to "exist forever", its fragmented processing approach may dissolve the profound meaning of cultural symbols.

4.2. Pathways for Industry Upgrade and Iteration

This study takes the development of Henan TV's "Chinese Festivals" series as an example to analyze the pathways for industry upgrade and iteration. During the Spring Festival of 2021, Henan TV presented "The Night Banquet of Tang Palace" in the "2021 Henan Spring Festival Gala", which promptly gained popularity and initiated the "Chinese Festivals" series. Subsequently, Henan TV has continuously expanded this series with cultural programs such as "The Water Assignment of the Luo Shen" as core IPs. Through the "culture + technology" model, a comprehensive "Chinese Festivals" series has been formed.

4.2.1. Digitalization of resources and immersive presentation

The "Chinese Festivals" series of Henan TV transcends the constraints of traditional stages by leveraging technologies like virtual reality (VR), 3D modeling, and computer graphics (CG) effects, creating an immersive experience. "The Night Banquet of Tang Palace" employs AR technology to construct a museum scene, giving the audience the impression of being at the birthplace of the Tang Dynasty figurines. "The Bodhisattva of Longmen" utilizes 3D laser scanning and augmented reality technology to restore the Longmen Grottoes and presents a 360-degree freeze-frame of the female lead dancer through the "bullet time" effect. "The Water Assignment of the Luo Shen" combines underwater shooting and digital compositing techniques to vividly reproduce classic dance poses. Additionally, the program has established a "Tang Palace Dance Score Database", achieving the digital preservation and retrieval of traditional dances.

4.2.2. Decoupling of IP symbols and cross-media dissemination

Henan TV has disassembled the costume patterns (such as the color gradient of Tang Sancai) and scene props (such as the water curtain effect in "The Water Assignment of the Luo Shen") in the programs into design material packages suitable for cross-media dissemination. Open licenses have been granted to enterprises like the Hanfu brand "Thirteen Yu", reducing the development cycle of derivatives to 15 days. Simultaneously, during the popularity of "The Wondrous Night of Lantern Festival", Henan TV introduced a series of cultural and creative products themed around "Tang Palace Little Sisters" and created stories centered around the IP image [15]. This symbol decoupling strategy not only promotes the cross-industry derivation of cultural IPs but also provides a rich material foundation for the cultural and creative industry.

4.2.3. Ecological feedback and user Co-creation

The program has implemented a user co-creation mechanism through the "Finger Museum" mini-program. Many viewers have voluntarily developed related emojis for secondary creation and widely disseminated them in the online space, triggering an "emoji economy" [16]. These secondary creation videos, after being screened by algorithms, have the popular ones incorporated into new editions of the program, thereby forming a closed loop of "professional creation - user participation - content iteration". Additionally, Henan TV has initiated the "Tang Palace Night Banquet Hand-drawing

Competition", encouraging viewers to undertake secondary creation, which has sparked a "co-creation craze".

The "Chinese Festivals" series of Henan TV has successfully accomplished the digital transformation and multi-industry development of traditional culture through the three-stage evolutionary logic of "resources - IP - ecology". Nevertheless, in the process of cultural digitalization, although technological empowerment has lowered the creation threshold, it might also lead to the oversimplification and flattening of cultural symbols. The underwater dance in "The Water Assignment of the Luo Shen" has been reduced to the label of "beautiful scenes", and the literary conception of "The Luo Shen Fu" and the aesthetic spirit of the Wei and Jin Dynasties have been lost in secondary dissemination. The algorithm screening mechanism prioritizes the promotion of highly interactive content, resulting in some in-depth adaptations being marginalized by the logic of traffic. Hence, while the algorithm screening mechanism facilitates content dissemination, it also intensifies the contradiction between cultural depth and dissemination efficiency.

4.3. User Participation in Innovation Pathways

This study takes the Cantonese virtual idol "Yue Xiaoman" as an example to analyze the user participation in innovation pathways. "Yue Xiaoman" is the world's first Cantonese virtual idol jointly created by Guanghe Future Technology and Guangdong Network Radio and Television Station. It has multi-language interaction capabilities, and its name is inspired by the Chinese solar term "Xiaoman". Through the deep integration of AI technology and the metaverse scene, "Yue Xiaoman" aims to promote Cantonese culture and explore the digital expression path of traditional culture.

4.3.1. Policy adaptation: Bidirectional coupling of Top-level design and regional culture

The core logic of the "Yue Xiaoman" project closely aligns with the national and local cultural digitalization strategies. At the national level, the "Opinions on Promoting the Implementation of the National Cultural Digitalization Strategy" explicitly states that "we should promote the digital transformation and dissemination of excellent cultural resources"; the "Action Plan for Cultivating Digital Creativity Strategic Emerging Industry Clusters (2023-2025)" of Guangdong Province further refines the goals, requiring "empowering cultural inheritance with metaverse and virtual reality technologies". Against this backdrop, Guangdong Radio and Television Station, relying on the "Yue Ting" software, developed "Yue Xiaoman", which not only responds to the policy's advocacy for technology empowerment but also opens up a new path for the inheritance of Cantonese culture.

4.3.2. Technological response: AI-driven immersive interaction and symbol reconstruction

The technical architecture of "Yue Xiaoman" is centered on AI, real-time rendering, and holographic projection, building a virtual-real fusion cultural communication ecosystem:

First, dynamic capture and autonomous learning: Through motion capture animation and game engine technology, "Yue Xiaoman" can simulate human expressions and body language in real time and continuously optimize the dialogue model during interaction. For example, when participating in the "Bay Area So Young" cloud concert, it dynamically adjusted the performance rhythm based on the audience's bullet comments, demonstrating human-like interaction capabilities.

Second, metaverse scene expansion: In the "Yue Ting Sound Trend Awards Ceremony", "Yue Xiaoman" performed with Hong Kong singer Yim Ming Xi in a virtual setting through holographic projection technology, achieving cross-regional cultural integration. The viewing volume exceeded 5 million, confirming the breakthrough of technology in cultural communication boundaries.

Third, technological practice for dialect protection: The platform opens the "Emoticon Workshop" function, allowing users to upload Cantonese voices to generate dynamic emoticons. The AI algorithm automatically recognizes dialects and colloquialisms and converts them into visual symbols, promoting the transformation of dialects from oral expression to digital assets.

4.3.3. Market feedback: Data-driven ecological closed loop and value multiplication

"Yue Xiaoman" accumulates user behavior data through multi-platform operations and builds a closed-loop ecosystem of "creation - dissemination - monetization":

First, user co-creation mechanism: Users can customize virtual character images and interaction scripts through AI tools. High-quality content is included in the official IP library, and creators receive sales commissions, leading to the development of co-branded cultural and creative products such as "Xiaoman Tea Sets" and "Cantonese Learning Blind Boxes".

Second, cultural and tourism integration practice: In the 2024 metaverse cultural and tourism event with Guangzhou Yongqingfang, user-created AR navigation routes were reverse-integrated into the scenic area's mini-program, driving an increase in offline visitor traffic and forming a collaborative model of "virtual experience - physical consumption - data".

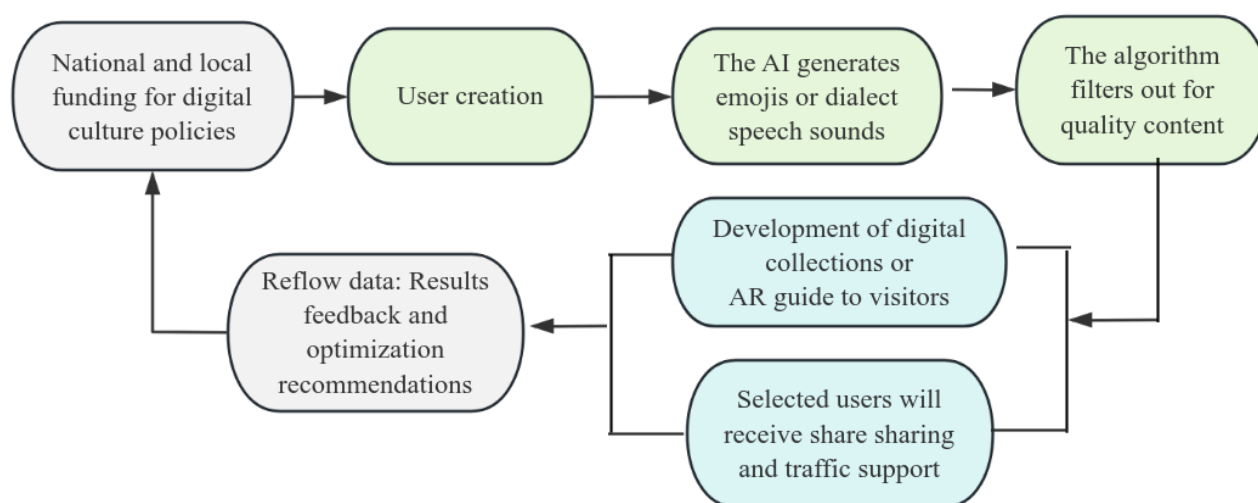


Fig. 1 Closed-loop flow chart of the user participation path

As shown in Fig.1, the user participation path of "Yue Xiaoman" builds a closed-loop ecosystem through the four stages of "policy - creation - monetization - feedback": Under the guidance of national and local cultural policies, users create dialect emoticons or voice content through AI tools; the platform algorithm screens high-quality content and converts it into digital collections or AR navigation routes to ensure that creative users receive shares and traffic support. Subsequently, user data is fed back to the policy department for rule optimization, ultimately forming a positive cycle, verifying the practical value of the "policy - technology - market" triple helix model.

Overall, the success of "Yue Xiaoman" lies in activating user participation through technological tools, but its sustainable development needs to break through the shackles of traffic logic because only in the dynamic balance of efficiency and depth can the user participation path truly become a lasting driving force for cultural innovation.

5. Challenges and Countermeasures

5.1. The Dynamic Game between Copyright Protection and Technological Innovation

5.1.1. Contradiction analysis

The rapid iteration of digital technologies has exacerbated the conflict between copyright protection and technological innovation, reducing the cost of copying and adapting cultural content to nearly zero. In 2024, artist Wang Chengyu sued Hainan Lianhe Technology Co., Ltd., accusing it of unauthorized minting and sale of digital collectibles based on his copyrighted art work "Xi" on its operated iBox website. Such cases prove that the current copyright law has difficulty in defining the rights ownership of AI-generated content, and technology developers often evade responsibility by citing "fair use".

5.1.2. Countermeasure suggestions

First, build a level of the right confirmation system: For different creative subjects, a differentiated copyright registration and revenue distribution mechanism should be established. AI-generated content should be required to clearly indicate the source of the original materials and the contribution ratio of the AI model. Meanwhile, a national-level "AI Creation Compensation Fund" can be established, and the distribution of the fund should be automatically executed through smart contracts to ensure transparency and efficiency.

Second, to improve the technical ethics norms: Promote industry alliances to formulate technical application guidelines for AI-generated content (AIGC), requiring platforms to complete copyright reviews before model training and establish a "white list" database. Additionally, a third-party institution composed of experts from the fields of law, technology, and culture can be established to conduct ethical evaluations of controversial AI applications.

Third, to strengthen the cross-border cooperation mechanism: Refer to the regulatory framework of the EU's Digital Services Act to establish a cross-national copyright data sharing platform and promote mutual recognition of technical standards in areas such as AI copyright labeling and blockchain evidence preservation among countries. Through international cooperation, it is possible to better address the global challenges of digital copyright protection.

5.2. The Constraining Effect of the Urban-Rural Digital Divide on the Upgrading of Business Forms

5.2.1. Contradiction analysis

The disparity in digital infrastructure and talent reserves between urban and rural areas has led to a significant regional imbalance in the digital transformation of the cultural and creative industries. Secondly, in terms of the consumption of digital cultural products, there are also significant gaps between urban and rural areas and between generations. For instance, rural areas lack digital skills training and are unable to effectively participate in the user co-creation ecosystem. This divide not only restricts the inclusiveness of cultural consumption but also exacerbates the "digital plundering" of cultural resources—urban capital acquires rural cultural IPs at low prices but fails to provide feedback to the local communities.

5.2.2. Countermeasure suggestions

First, Implement the Infrastructure Subsidence Plan: Through financial subsidies and software models, deploy "Digital Cultural Public Service Stations" in key county areas, equipped with 3D scanners, cloud computing nodes, and VR experience equipment to support rural users' participation in content creation through ordinary smartphones; incorporate cultural digitization into the key areas of "new infrastructure" to ensure the smooth transmission of high-definition cultural resources.

Second, Promote the "Digital Culture Inclusive Project": Jointly launch training courses for "Rural Cultural Brokers" by universities and technology enterprises to help local communities master IP operation and digital tools. It is also possible to build a "Rural Cultural Digital Gene Pool" and make it freely available to rural users.

Third, Establish a Benefit Sharing Mechanism: Mandatorily require urban enterprises to sign revenue-sharing agreements with local communities when developing rural cultural IPs and achieve transparent distribution through blockchain technology; establish a "Rural Cultural Digital Passport" system to register the sovereignty of important cultural symbols, and commercial use is not allowed without permission.

6. Conclusion

Based on the three-dimensional framework of "technology convergence-driven - business form upgrading and evolution - innovation ecosystem synergy", this study systematically analyzed the innovation path of the cultural and creative industries driven by the digital economy. Firstly, technology convergence promotes the digital translation of cultural heritage through the bidirectional coupling of physical adaptation and symbol reconstruction. Secondly, business form upgrading reconstructs the value chain of cultural production through the three-stage breakthroughs of resource digitization, IP decoupling, and ecological feedback. Thirdly, the user participation path, centered on the synergy of policy guidance, technical response, and market feedback, validates ecological sustainability. The three, through the circular logic of "technology enabling business form upgrading, business form activating ecological synergy, and ecology feeding back technological innovation", ultimately form a symbiotic system for the digital transformation of the cultural and creative industries.

However, this study still has certain limitations: Firstly, the selected cases are concentrated in developed areas, with insufficient coverage of rural practices, which may lead to limited universality of the conclusions. Secondly, the discussion on the ethical risks of AIGC is relatively shallow, and a complete digital governance evaluation system has not yet been constructed. Thirdly, the theoretical model of symbol reconstruction theory focuses more on technical logic and pays insufficient attention to the initiative of cultural subjects. Therefore, future research can further explore the following directions: Firstly, deepen the research on technology ethics and construct a digital governance framework that considers both efficiency and fairness. Secondly, focus on the cultivation mechanism of rural digital cultural ecology to solve the structural contradiction of misallocation of urban and rural resources. Thirdly, explore the disruptive impact of emerging technologies such as the metaverse and brain-computer interfaces on the cultural experience paradigm. Only in the dynamic balance of technological innovation and humanistic value can the cultural and creative industries achieve sustainable and high-quality development.

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