

Research on the Development Mechanism and Path of Digitalization of Sports Intangible Cultural Heritage in the Algorithm Era

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ABSTRACT

In the algorithm era, the rapid development of digital technology has brought new opportunities and challenges to the protection and inheritance of sports intangible cultural heritage (hereinafter referred to as sports ICH). This paper deeply analyzes the internal mechanism of the digital development of sports ICH and explores its innovative paths in the algorithm era. The study finds that algorithm technology reshapes the preservation, dissemination, and experience models of sports ICH through accurate data collection and analysis, personalized dissemination and promotion, and immersive experience construction. However, the digital development of sports ICH also faces difficulties such as bottlenecks in technology application, dilution of cultural connotations, and shortage of talents. To break through these difficulties, it is necessary to strengthen technological research and development and application innovation, intensify the in - depth excavation and presentation of cultural connotations, increase the cultivation of professional talents, and build a development model of multi - party collaboration among the government, enterprises, and society. This will promote the sustainable development of sports ICH in the digital era, rejuvenate its vitality and charm in the new era, and contribute to the construction of a strong cultural and sports country.

KEYWORDS

Algorithm Era; Sports Intangible Cultural Heritage; Digital Development; Development Mechanism; Innovative Path

1 Introduction

As a treasure of human sports culture, sports ICH carries rich historical memories, national spirits, and cultural values. From traditional martial arts, acrobatics to folk sports activities, they are not only the inheritance of sports skills but also an important symbol of national cultural identity. In the context of accelerating globalization and modernization, many sports ICH projects are facing inheritance difficulties, such as a reduction in the audience and in inheritors (Wang & Qiu, 2017).

With the advent of the algorithm era, digital technologies such as big data, artificial intelligence, and virtual reality have provided new ideas and methods for the protection and inheritance of sports ICH. Digital technology can break through time and space limitations, achieve the digital preservation, dissemination, and innovative development of sports ICH, and inject new vitality into the inheritance and development of sports ICH. Therefore, in - depth research on the development mechanism and path of the digitalization of sports ICH in the algorithm era has important theoretical and practical significance.

2 The Value of the Digital Development of Sports ICH in the Algorithm Era

2.1 Digital Preservation to Avoid the Disappearance and Distortion of Sports ICH

Sports ICH is mostly inherited through oral and physical teaching, and is vulnerable to factors such as the natural environment and social changes, facing the risk of disappearance or distortion. Digital technologies such as 3D scanning, motion capture, and high - definition photography can comprehensively and accurately record and preserve the movements, skills, costumes, props, etc. of sports ICH, forming digital archives. These digital archives can not only preserve the original information of sports ICH for a long time but also facilitate retrieval and review, providing a reliable basis for subsequent research, teaching, and inheritance, effectively avoiding the loss or distortion of information caused by human factors in the inheritance process of sports ICH (Yuan & Gu, 2018).

2.2 Digital Restoration to Re - present the Historical and Cultural Scenes of Sports ICH

Through virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies, the historical and cultural scenes contained in sports ICH can be digitally restored and presented. For example, VR technology can reproduce the scenes of ancient martial arts competitions, allowing the audience to experience the charm of ancient sports culture immersive. Through AR technology, elements of sports ICH can be superimposed on the real - world scene. For example, projecting traditional acrobatic performances onto urban squares can enhance the interaction between sports ICH and

modern life. This digital restoration can enable people to more intuitively understand the historical origin and cultural connotations of sports ICH, promoting the cultural inheritance and dissemination of sports ICH.

2.3 Digital Dissemination to Expand the Influence and Audience of Sports ICH

In the algorithm era, new media such as social media and short - video platforms have become important channels for information dissemination. With the help of big data analysis and algorithm recommendation, content related to sports ICH can be accurately pushed to interested users, achieving personalized dissemination. At the same time, forms such as short - videos and live broadcasts can vividly and interestingly display the charm of sports ICH, attracting the attention of more young audiences. For example, some martial arts inheritors have gained a large number of fans by posting martial arts teaching videos and wonderful performance clips on short - video platforms, making the traditional sports ICH project of martial arts more widely spread. Digital dissemination breaks through the time and space limitations of the dissemination of sports ICH, expands its influence and audience, and creates a good social atmosphere for the inheritance and development of sports ICH (China Internet Network Information Center, 2024).

2.4 Digital Innovation to Promote the Integrated Development of Sports ICH and Modern Life

Digital technology provides new possibilities for the innovative development of sports ICH. On the one hand, through forms such as digital animation and games, elements of sports ICH can be integrated into modern cultural products, creating cultural and creative products with sports ICH themes that have the characteristics of the times. For example, animated films and games with traditional martial arts as the theme not only enrich the content of cultural products but also enable sports ICH to enter people's lives in a new form. On the other hand, artificial intelligence technology can analyze and optimize the movements and skills of sports ICH, providing reference for modern sports training and competitions. In addition, digital technology can also promote the integrated development of sports ICH with industries such as tourism and education, developing sports ICH - themed tourism routes, research and study courses, etc., realizing the economic and social value of sports ICH and promoting its sustainable development in modern society (Li & Chen, 2019).

3 The Development Mechanism of the Digitalization of Sports ICH in the Algorithm Era

3.1 Algorithm - Driven Data Collection and Analysis

In the process of the digitalization of sports ICH, algorithm technology is first applied to the data collection and analysis link. Through devices such as sensors and cameras, action data, physiological data, etc. during the performance of sports ICH can be collected in real - time. Using algorithms to analyze these data can deeply understand the action characteristics, technical essentials of sports ICH, and the physical state of inheritors. For example, in the digital research of martial arts, three - dimensional coordinate data of martial arts movements are collected through motion - capture devices. Using data analysis algorithms, key nodes and movement trajectories of martial arts movements can be extracted, providing data support for the standardization and normalization of martial arts movements. At the same time, algorithms can also integrate and analyze multi - source data such as texts, images, and videos related to sports ICH, mining the cultural connotations and historical information contained therein, and providing a comprehensive knowledge map for the protection and inheritance of sports ICH.

3.2 Personalized Recommendation and Precise Dissemination

A remarkable feature of the algorithm era is the ability to make personalized recommendations based on users' interests, behaviors, and other data. In terms of the dissemination of sports ICH, through the analysis of users' behavior data such as browsing history, likes, and comments on social media and video platforms, recommendation algorithms can accurately push sports ICH content that users are interested in. For example, for users who like traditional dances, the recommendation algorithm can push representative folk dance - type sports ICH projects; for users who are concerned about local culture, local characteristic sports ICH activities are recommended. This personalized recommendation and precise dissemination can improve the reach rate of sports ICH content, enhance users' attention and recognition of sports ICH, and promote the dissemination and inheritance of sports ICH among different groups.

3.3 Immersive Experience and Interactive Participation

The application of virtual reality (VR), augmented reality (AR), and mixed reality (MR) technologies in the digitalization

of sports ICH brings new ways of immersive experience and interactive participation to users. With the help of VR devices, users can immerse themselves in the performance site of sports ICH as if they were participants. Through AR technology, users can interact with elements of sports ICH in the real - world scene. For example, interacting with virtual dragon - dancing performances through mobile phone screens can enhance users' sense of participation and interest. In addition, some digital projects of sports ICH also set up interactive links, such as real - time interactive Q&A in online martial arts teaching courses and multiplayer cooperation in sports ICH games, allowing users to deeply understand the cultural connotations and technical essences of sports ICH in the interaction, and improving users' love and inheritance willingness for sports ICH.

3.4 Cross - border Integration and Innovative Development

The algorithm era has promoted the cross - border integration and innovative development of sports ICH with other fields. On the one hand, the integration of sports ICH and the digital cultural industry has given birth to a series of new cultural products and business forms, such as digital animations, online games, and digital exhibitions with sports ICH themes, opening up new channels for the dissemination and development of sports ICH. On the other hand, the integration of sports ICH with industries such as education, tourism, and health has expanded the application scenarios and value space of sports ICH. For example, incorporating sports ICH into school physical education courses to cultivate students' interest in traditional culture and inheritance awareness; developing sports ICH - themed tourism routes to attract tourists to experience the charm of sports ICH; using traditional fitness methods in sports ICH to carry out health - preservation activities, promoting the combination of sports ICH and the health industry. This cross - border integration and innovative development not only enriches the connotations and forms of sports ICH but also provides new impetus for its sustainable development in modern society (Jenkins, 2006).

4 The Paths of the Digital Development of Sports ICH in the Algorithm Era

4.1 Strengthen Technological Research and Development and Application Innovation

The government and relevant institutions should increase investment in the research and development of digital technologies for sports ICH, encourage universities, research institutes, and enterprises to carry out industry - university - research cooperation, and overcome key technical problems in the digitalization of sports ICH, such as improving the accuracy of motion capture, optimizing virtual reality scenes, and improving big data analysis algorithms. At the same time, actively promote the application innovation of digital technology in the field of sports ICH, and explore digital solutions suitable for the protection and inheritance of sports ICH. For example, develop a special digital protection platform for sports ICH, integrating functions such as data collection, storage, management, display, and dissemination, providing one - stop services for the digital development of sports ICH; use blockchain technology to realize the confirmation of rights and transactions of digital assets of sports ICH, protect the rights and interests of inheritors, and promote the transformation of the economic value of sports ICH.

4.2 Intensify the In - depth Excavation and Presentation of Cultural Connotations

In the process of the digitalization of sports ICH, attention should be paid to the in - depth excavation and presentation of its cultural connotations. On the one hand, strengthen research on the historical origin, cultural background, inheritance stories, etc. of sports ICH, and record and display them through various forms such as texts, pictures, and videos, so that the audience can better understand the cultural values contained in sports ICH. On the other hand, in the design and development of digital products, the cultural connotations of sports ICH should be combined with modern aesthetics and needs to create works with appeal and attractiveness. For example, in animated films with sports ICH themes, not only wonderful sports skills should be displayed, but also the national spirit and values carried by sports ICH should be transmitted through the storyline, so that the audience can be influenced and infected by culture while enjoying the works.

4.3 Increase the Cultivation of Professional Talents

Cultivating a group of professional talents who understand both sports ICH and digital technology is the key to promoting the digital development of sports ICH. Universities should strengthen the construction of relevant majors and courses, offer professional courses such as the digital protection of sports ICH, digital media technology, and sports culture, and cultivate compound talents. At the same time, strengthen the digital technology training of sports ICH inheritors and relevant practitioners, improve their digital awareness and skill levels, so that they can better participate in

the digital work of sports ICH. In addition, through forms such as training courses and seminars, exchanges and cooperation among professional talents in the field of sports ICH can be strengthened to promote knowledge sharing and experience dissemination.

4.4 Build a Multi - party Collaborative Development Model

The digital development of sports ICH requires the cooperation of the government, enterprises, and society. The government should play a leading role, formulate relevant policies and regulations, increase capital investment, and guide and support the development of digital projects of sports ICH. Enterprises should actively participate in the development and market promotion of digital products of sports ICH, give play to the role of the market mechanism, and promote the development of the digital industry of sports ICH. Social organizations and volunteers should actively participate in the publicity, promotion, and inheritance of sports ICH, creating a good social atmosphere. For example, the government can set up a special fund for the digital development of sports ICH to support the research, development, and promotion of excellent projects; enterprises can cooperate with sports ICH inheritors to develop digital products with market competitiveness; social organizations can hold digital exhibitions, lectures, etc. of sports ICH to improve the public's awareness and participation in the digitalization of sports ICH. Through multi - party cooperation, a strong joint force can be formed to promote the digital development of sports ICH.

5 Conclusion

The algorithm era has brought unprecedented opportunities for the digital development of sports ICH. Through digital preservation, dissemination, innovation, etc., sports ICH can be effectively protected and inherited, rejuvenating its vitality in modern society. However, the digital development of sports ICH also faces many challenges, and it is necessary to start from aspects such as technological research and development, cultural connotation excavation, talent cultivation, and multi - party cooperation to explore practical development paths. Only in this way can the sustainable development of sports ICH in the algorithm era be realized, allowing this precious cultural heritage to shine more brightly in the new era, and contributing to promoting cultural diversity and the progress of human civilization. In the future, with the continuous development and innovation of digital technology, the digital development of sports ICH is expected to achieve more fruitful results, bringing more colorful cultural experiences to people.

Funding

Research Project of Zhejiang Federation of Humanities and Social Sciences : 2025N023

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