THE DEVELOPMENT STATUS OF SHAOXING ANCIENT ROAD AND THE PATH OF DIGITAL PROTECTION AND ACTIVATION

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Abstract: Since 2024, the ancient paths of Shaoxing have gradually become a focus of attention amid the complex environment of cultural inheritance and tourism development. Despite their rich historical and cultural value and significant tourism potential, they currently face challenges such as insufficient infrastructure, lagging digitalization, and low visitor engagement. These factors have become constraints on the sustainable development of the ancient paths in Shaoxing. However, with the growing awareness of historical and cultural heritage protection and the rise of smart tourism concepts, the digital transformation and revitalization of the ancient paths in Shaoxing present new opportunities. This article aims to deeply analyze the current situation of the ancient paths in Shaoxing and their digital protection and revitalization paths. Through research on the development of the ancient paths and in combination with changes in the domestic market and visitor demands, it explores how to effectively inherit and revitalize the culture of the ancient paths by applying modern digital technologies. The article uses the SWOT analysis method to comprehensively assess the advantages, disadvantages, opportunities, and threats of the ancient paths in Shaoxing during the digital transformation process, and proposes practical and feasible protection and revitalization strategies to promote the sustainable protection of the ancient path cultural heritage, facilitate balanced development between cultural heritage protection and tourism development, and further enhance its competitiveness in the domestic and international cultural tourism markets.
Keywords: Shaoxing ancient road; Digital protection; Activation path; Smart tourism; Cultural heritage; SWOT analysis

1 INTRODUCTION

With the advent of digital age, Shaoxing Ancient Road, as an important historical and cultural heritage in China, is facing new opportunities and challenges in its protection and activation. Li Ying pointed out that three-dimensional digital protection of cultural heritage has become a trend, which can carry out in-depth analysis and comprehensive sorting of the content of cultural heritage, heirs and related archival materials, and formulate a more integrated and scientific digital protection system, which will bring a lot of benefits to the protection and inheritance of intangible cultural heritage[1].

This paper aims to deeply analyze the development status of the Ancient Road in Shaoxing, including its historical value, tourism potential and environmental impact, and identify the difficulties and challenges in the current protection, in order to provide practical guidance for the sustainable development of the ancient road. At the same time, this paper will discuss the application path of digital technology in the protection and activation of ancient roads, such as the use of digital maps, virtual reality (VR) and augmented reality (AR) and other technical means, to reconstruct the historical scenes and tourism experience of ancient roads, and enhance the sense of participation and cultural identity of tourists. In addition, the research will focus on how to realize the dissemination and sharing of ancient road culture through digital platforms, so as to promote its recognition and influence at the broader social level, so as to open up new development ways for the ecological protection and cultural tourism development of Shaoxing Ancient Road.

2 RESEARCH REVIEW

2.1 Research Purpose

2.1.1 Heritage and protection of ancient road culture

As a linear heritage with a history of more than 100 years or special significance, ancient roads play an important role in the connection of culture, politics and economy, and become the common material and spiritual cultural heritage of mankind[2]. With the acceleration of modernization, many ancient roads are gradually abandoned or destroyed, and the cultural memory and historical value of ancient roads are facing the risk of disappearing. Although some ancient roads are listed as cultural relics protection units, the protection is limited and there is no systematic inheritance mechanism, so the research and protection of ancient roads need multi-disciplinary cooperation, including archaeology, architecture, sociology and so on. At the same time, with the support of international projects and institutions, using new technologies such as virtual reality and three-dimensional reality modeling, conservation experiences and techniques

can be shared, helping to excavate and pass on ancient road culture, so that more people can understand and cherish these valuable cultural heritage[3].

2.1.2 Environmental protection and sustainable development of ancient roads

The protection of ancient roads is not only the protection of culture, but also the protection of the natural environment. In the face of urbanization, climate change and ecological destruction, the development of digital technology provides new means for environmental protection and sustainable development of ancient roads. Through scientific and technological means, resource monitoring and management can be better realized. For example, the intelligent monitoring system uses the Internet of Things (IoT) technology to develop an environmental monitoring system to monitor the environmental quality along the ancient road in real time, and to find and deal with potential environmental problems in a timely manner; Establish a digital management platform for the ancient road, provide access and interactive functions, so that tourists and researchers can obtain comprehensive information about the ancient road and its environment, and enhance the public's sense of participation and responsibility for the protection of the ancient road; The use of VR technology to reproduce the historical and cultural scenes of the ancient road, so that tourists can be immersive even if they are not on-site, reducing the pressure on the actual environment.

2.1.3 Promote healthy lifestyle promotion

The ancient trail usually passes through beautiful natural areas, and hiking there can reduce the stress of city life and improve mental health. According to the Proceedings of the National Academy of Sciences, exposure to nature can help reduce symptoms of anxiety, depression and improve overall psychological well-being. Through outdoor walking, the project encourages the public to participate in a healthy lifestyle and improve the health level and quality of life of the public.

2.2 Research Status and Development Trends of Ancient Roads in and outside China

2.2.1 Foreign situation

The protection and utilization of route cultural heritage including ancient post road started earlier in foreign countries. The World Heritage Committee, dedicated to the Convention on the Protection of the World Cultural and Natural Heritage, was established in 1976, and 45 cultural routes have been recognized by the Council of Europe since the implementation of the "European Cultural Routes" programme in 1987. The above-mentioned Conventions and programmes have achieved remarkable results in the discovery of common heritage and the promotion of cultural interaction, religious dialogue, landscape conservation and cultural cooperation. It aims to play the role of the carrier or medium of the value of the ancient way, stimulate the historical value, artistic value, scientific value and economic value of the cultural heritage through the activation and utilization, thereby enhancing the cultural soft power and promoting the sustainable development of regional economy and society.

In recent years, the Italian Ministry of Culture has organized and implemented a full-line aerial survey of the Apia Ancient Road, used digital technology to generate photogrammetric maps, and laser detection and measurement technology to generate digital terrain models, and developed geographic information systems on this basis to unify and integrate cultural heritage resources, protection and management information, activation and opening projects and related data. The "geo-cultural" platform that forms the modern walking road[4].This can not only enhance the value of the Apia Road itself, but also promote the coordinated development of the surrounding social and cultural space and create broader social benefits.

The digital preservation and revitalization of the cultural routes of the Loire Valley in France is a comprehensive project aimed at preserving and promoting the region's rich cultural heritage through modern technological means. In terms of digital preservation, Google partnered with the French Ministry of Culture to scan the castles of the Loire Valley through the Street View mapping project, making it easy for people to visit these sites via the Internet without having to go in person. This digital approach not only protects monuments from natural and man-made destruction, but also provides easy access for users around the world. The route provides interactive guided Tours through digital technologies such as virtual reality and augmented reality, enabling visitors to learn about the historical and cultural background of the ancient trail through their smartphones or tablets. In terms of activation, the Loire Valley Cultural Route offers a new tourist experience by combining historical sites, natural landscapes and cultural heritage. France is implementing a national cycle path plan, the implementation of the "Loire on a bike" project, tourists can cycle through it, visit the cultural villages along the line, these activities have led to the development of the village. This development model not only protects the cultural heritage, but also promotes the development of the local economy and provides new employment opportunities for local residents[5].

2.2.2 Chinese situation

In the process of ancient road protection, there is still unclear space in theory, and in practice there are some chaos of protection, such as impersonating local residents and defrauding passengers, and not in accordance with the regulations caused by environmental pollution and hidden danger of safety, but you can still see that our country's ancient road protection work has been continuously prosperous and development. On November 19, 2021, the "Measures for the Protection of Ancient Roads in Zhejiang Province", which is the country's first local legislation dedicated to the protection of ancient roads, will focus on three aspects of the relevant work: first, the establishment of digital protection mechanisms; Second, strengthen publicity and promotion; Third, the scientific use of ancient road resources[6].

In 2013, Wenzhou City took the lead in carrying out the ancient road survey in the province and formulated the "Wenzhou Ancient Road Survey Work Plan". In 2017, it took the lead in developing the "Wenzhou Ancient Road APP" to bring intelligent ancient road tour experience to citizens. Since the implementation of the Measures for the Protection of Ancient Roads in Zhejiang Province, Wenzhou has fully started the work of protecting ancient trees and ancient roads in digital scenarios. In order to realize the digital protection of the ancient road and ancient trees, the ancient and famous trees along the Tiangguangshan Ancient Road in Taishun have been installed with two-dimensional code signs. Tourists can obtain relevant information through new media after scanning the two-dimensional code, so as to experience more abundant activities of wayboarding and tree name recognition. The "digitalization" of ancient road protection will combine a number of technologies such as Internet of Things perception, artificial intelligence analysis and three-dimensional modeling to promote the innovative protection and development of ancient and famous trees and ancient roads, and the digital application will also make the "activation" of ancient roads more closely integrated into the Internet era[7].

Through the application of advanced digital tools, such as geographic information system (GIS), virtual reality (VR) and augmented reality (AR), the history and culture of the Tea Horse Ancient Road can be more vividly reproduced, and visitors can deeply understand the historical background, cultural exchanges and trade exchanges of the ancient road through the digital platform. In addition, the 3D image mapping technology is used to collect image information for the cultural relics of the cultural route. At the same time, the height and width data of immovable cultural relics can be visualized, digital database of the ancient Tea Horse Road and 3D spatial model construction can be established to restore the original style of cultural relics and repair damaged buildings, grottoes and sites. In addition, we can also make a representative walking animation of the ancient road to explain the ancient road in a simple animation form. Or design a traditional rock climber image and use 3D printing technology to derive cultural IP image[7].

2.3 Methods of Research

Literature research method: By accessing multiple academic databases (such as CNKI and Google Scholar), collecting historical data, academic papers and related industry reports, and analyzing the role of Shaoxing Ancient Road in cultural protection and tourism development.

Case study method: The successful digital protection projects of cultural heritage at home and abroad (such as the landscape of the Loire Valley in France) are selected as references, and the protection and activation mode suitable for Shaoxing Ancient Road is summarized based on their experience.

SWOT analysis: SWOT analysis is carried out on the current development status of Shaoxing Ancient Road, and its advantages (such as rich cultural history), disadvantages (such as shortage of funds), opportunities (such as policy support) and threats (such as the impact of modern transportation on ancient road tourism) in the process of digital transformation are deeply studied, so as to provide basis for effective protection and activation strategies.

3 SWOT ANALYSIS

3.1 Strength

Shaoxing Ancient Road has a long history and profound cultural heritage, which provides sufficient cultural content support for its digital transformation, attracting more tourists and culture lovers;Good natural environment: The natural beauty around the ancient trail is abundant, and digital means can help showcase these natural resources and enhance the visitor experience; Meanwhile, local governments' emphasis on cultural heritage protection and relevant policy support can promote the process of digital transformation and increase capital and technology investment. With the advancement of science and technology, digital transformation can be combined with the traditional culture of Shaoxing region to develop characteristic tourism products and form a unique cultural tourism experience.

3.5 Weakness

From the point of view of Shaoxing Ancient Road itself, with the increase in the number of tourists, the environment of Shaoxing Ancient Road is also facing increasing pressure. It is necessary to strengthen environmental protection and management to prevent the destruction of ancient roads. At present, the competition between the domestic cultural tourism market and the outdoor walking market is fierce, and the Shaoxing Ancient Road needs to improve its competitiveness and attraction constantly； In terms of economic environment, the revitalization and protection of Shaoxing Ancient Road may be affected by the economic cycle. When the economic environment is good, people have more disposable income to travel and experience cultural monuments. When the economic environment is poor, people's disposable income will decrease, which may reduce the investment in tourism and cultural monuments, which may pose a threat to the activation and protection of Shaoxing Ancient Road;With the acceleration of urbanization, some traditional ancient buildings may also be affected by urban renewal. How to maintain the original appearance and characteristics of ancient roads in the process of urbanization is also an important challenge.

3.6 Opportunity

Digital transformation has brought many development opportunities to Shaoxing Ancient Road. As tourists' emphasis on cultural and historical experiences continues to grow, Ancient Roads can use digital technology to attract young tourists and satisfy their quest for novel experiences. At the same time, cross-border cooperation with technology companies and tourism platforms will help to jointly develop intelligent navigation systems and online education platforms to achieve resource sharing and complementary advantages. In addition, through the application of digital technology, the ancient road can also strengthen the monitoring and management of the ecological environment along the route, promote the harmonious development of culture and nature, and enhance the overall ecological value.

3.7 Threat

The digital transformation of the ancient paths in Shaoxing also faces some external threats. Market competition is intensifying day by day. As more and more cultural attractions invest in digital transformation, the ancient paths need to constantly innovate to maintain their appeal. In addition, the rapid changes in technology may cause existing equipment and technologies to become outdated quickly, thereby increasing operational costs and maintenance burdens. Finally, as the degree of digitalization increases, issues of cyber security and data protection have become more prominent. The risks of information leakage and user privacy infringement may affect tourists' trust in digital projects.

4 CONCLUSION

Based on the current situation of the ancient paths in Shaoxing, the significance of digital transformation, and their protection and development trends, this article analyzes the challenges and opportunities faced by the ancient paths in Shaoxing during digital protection and proposes corresponding strategies and suggestions. Although there will be difficulties such as insufficient funds, shortage of technical talents, and lagging infrastructure during the digital transformation process, we believe that with the continuous progress of digital technology and the increasing attention paid by society to the protection of cultural heritage, the ancient paths in Shaoxing will achieve more sustainable development.

The digital transformation of the ancient paths in Shaoxing provides important references and lessons for other cultural heritage protection projects:

(1) Establish a multi-party collaboration mechanism: By establishing partnerships with local governments, cultural institutions, and technology companies, resources and technologies can be integrated to jointly promote digital protection projects. This collaboration not only provides the necessary financial support for the ancient paths in Shaoxing but also introduces advanced technologies and management experiences, thereby enhancing the popularity and appeal of the ancient paths.

(2) Develop localized digital products: In the design of digital platforms and content production, fully consider the cultural characteristics of the Shaoxing region and the diverse needs of tourists. For example, develop multi-language navigation apps, provide interactive content and AR experiences related to local history and culture, allowing tourists to have a deeper understanding of the history and value of the ancient paths in Shaoxing.

(3) Strengthen brand strategy and marketing promotion: Use diverse promotion channels, such as social media, cultural festivals, and online-offline joint marketing, to enhance the popularity of the ancient paths in Shaoxing both domestically and internationally. At the same time, highlight the unique culture and natural scenery of the ancient paths, and through high-quality user experiences, enhance tourists' participation, thereby attracting more domestic and foreign tourists.

(4) Implement dynamic monitoring and feedback mechanisms: Establish a visitor feedback system to collect opinions and suggestions from visitors during the digital experience process in a timely manner, and continuously optimize digital products and services. This feedback mechanism not only improves the visitor experience but also provides a basis for adjusting digital protection strategies.

In conclusion, the research on the digital protection and activation path of the ancient paths in Shaoxing provides practical and feasible references for the protection of cultural heritage in other places, helping related projects achieve more effective dissemination and sustainable development in modern society. By implementing the above strategies, the ancient paths in Shaoxing can not only effectively protect and inherit their cultural heritage but also occupy a place in the cultural tourism market and enhance overall economic benefits.

COMPETING INTERESTS

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