

A Study on the Digital Preservation and Cultural Translation of Architectural Heritage in Ancient Villages in Western Guangdong from the Perspective of Media Convergence: A Case Study of Wuniba Village, Lianjiang City, Guangdong Province

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Abstract: The ancient villages in western Guangdong integrate farming, clan and Confucian culture, carrying local memory and local identity. However, urbanization and labor outflow have caused dilapidated buildings and memory faults, facing the dual crisis of “physical damage” and “lack of expression”. Based on the theory of media convergence, this paper proposes a digital protection paradigm of “physical filing as the basis, virtual performance as the wing, and cultural identity as the soul”, breaking through the limitation of “emphasizing records and neglecting communication”. Taking Wuniba Village, a typical village of Zhanjiang’s “Millions of Projects”, as a case, the collaborative application of technology groups such as multi-source data fusion modeling, BIM Internet of Things monitoring, super-resolution image reconstruction, AR/VR immersive experience, and the complete chain of “cultural symbol extraction-landscape translation-cloud platform communication”. Studies have shown that digital protection does not “freeze” villages as data specimens, but activates the contemporary vitality of cultural genes through media, and realizes the paradigm transformation from “static archiving” to “living inheritance”.

Keywords: ancient villages in western Guangdong; digital protection; media convergence; cultural translation; virtual reality

1. Introduction

Ancient villages in western Guangdong are an important carrier of Lingnan culture, the knot of farming culture, clan culture and Confucian culture. The historical and cultural information contained in them is rich and profound, and they are known as “living fossils” of local culture. However, with the rapid advancement of industrialization and urbanization, a large number of ancient villages with rich cultural connotations and heavy historical values are gradually declining or even disappearing completely. It is urgent to strengthen the protection and inheritance of ancient villages in western Guangdong. This paper uses the theory of media convergence to think about the triple turns involved in the digital protection of ancient villages: from “single technology application” to “technology group collaborative empowerment”, from “static data archiving” to “dynamic cultural translation”, from “Expert-led protection” has become “reconstruction of villagers’ participation”. Make a specific analysis of Wuniba Village, a village of the “Millions of Projects” in Zhanjiang City, unify digital means with space transformation, cultural continuation and sense of identity, make a more complete discussion on how the ancient villages in western Guangdong are dynamic, and give a systematic solution ideas.

2. The core value and protection of ancient villages in western Guangdong

2.1 The value connotation of multiple cultural overlaps

The core values of ancient villages in western Guangdong are culturally diverse and complex. Unlike the Central Plains, where people live in a single system (i.e. one clan), in western Guangdong, due to the history of people migrating southward and repeatedly, the coexistence of multiple ethnic systems with “indigenous people, immigrants and Hakka” embedded in each other has gradually emerged.

In terms of material culture, the old buildings in western Guangdong adopted the courtyard-style design of the Central Plains, and took into account the hot and humid climate problems encountered in Lingnan. From this, highly unique architectural forms such as wok-ear gables, oyster shell windows and gray plastic ridges emerged. From the perspective of institutional culture, the ancestral hall is not only a house for worship, but also a center for village self-government or dispute resolution. It has clear regulations on how clan organizations operate. As for the spiritual aspect, folk phenomena such as “annual” parades, eight-note gongs and drums, and Leizhou ballads just organize the various periods of the year into a

rhythmic life framework that can be followed.

2.2 The dual crisis of material demise and narrative aphasia

There are two types of decline that ancient villages in western Guangdong are currently experiencing, and they reinforce each other. The first category is “material demise”. A second, less obvious but equally dangerous condition is “narrative aphasia.” Residential houses collapsed without timely repairs, most of the bluestone roads have been filled or replaced with cement, and ancient and valuable trees have lost their living space. As far as Zhanjiang is concerned, about 60% of the ancient buildings in the villages identified from various perspectives cannot guarantee structural safety, and the damage ratio of the main old buildings in the villages involved is sometimes as high as 40%.

What the protection of ancient villages requires is not the preservation of the bricks, tiles, wood and stones themselves, but the summary of the stories “told” by such material carriers - that is, various collective memories about the migration of ancestors, farming and reclaiming wasteland, resisting foreign enemies, and celebrating harvests. But now a large number of young adults no longer live in the village, and the population composition of the village is obviously imbalanced. According to statistics from Wuniba Village survey materials, about 15% of the villagers encountered are over 60 years old, and 80% only use mobile phones to complete communications (typing or sending text messages). Although young people are good at various APP applications, they are not enthusiastic about organizing local culture [1]. The “Double Hundred” spirit and red culture are only passed down to the elderly through oral tradition, and skills such as playing music and eagle dancing are lacking successors. If in the end all those who know about it die and no memory remains, if the stage collapses and no one plays the music, the “cultural gene” will completely lose its vitality. The dual crisis at this time reminds us: the protection of ancient villages should take both “material carrier preservation” and “cultural significance transfer” into the scope of thinking, and cannot rely on just one way of thinking to solve the problem.

3. Theoretical Turn and Practical Framework of Digital Protection

3.1 Paradigm shift from “static archiving” to “live propagation”

Digital technology is a fundamental element on which the current paradigm shift depends-it has achieved a more precise record of the material world, while at the same time rearranging the dissemination of cultural meaning. The article expresses this paradigm shift with “three transformations”: first, the relevant protection objects are extended from “building monomers” to “cultural ecosystems”, and intangible cultural heritage, oral and folk customs are all included in the same category of protection content; Second, the protection method has expanded from “physical repair” to “media communication”, using digital materials as resources for cultural teaching, tourism or community building; Third, the subject of protection has changed from “expert-led” to “pluralistic co-governance”, using low-difficulty digital media to encourage villagers to write their own history and tell their own culture [2].

3.2 Digital protection logic from the perspective of “integration of public transmission”

What the media convergence theory analyzes is that modern information dissemination does not stick to the old media, but exists with the characteristics of “all media infiltrate each other and all content is distributed on multiple platforms”. If this idea is applied to the protection of ancient villages, digital technology should be regarded not only as an archive, but also as a connection between “physical space” and “virtual narrative”, “professional protection” and “public participation”, “past memory” “and” future imagination “.

According to the above ideas, this paper incorporates the digital protection of ancient villages into the “three-level” logical framework: the basic part is to collect and sort out high-precision data and three-dimensional data to solve the problem of “what is there, what is there”; The connection part is composed of AR/VR and cloud communication, which is used to deal with the display problem of “how to see, how to transmit”; The value part does cultural symbol refinement and local translation, and explains “what it means and why it is important”. The three levels mentioned are continuous and indispensable. If only the digitization of the basic layer is “technicalism”, all layers must be connected to “activation” in order to make the heritage life.

4. Technical system construction: from data collection to immersive experience

4.1 High-precision 3D archiving through multi-source data fusion

The architectural forms of ancient villages seen in western Guangdong are diverse. They can be designed according to the Central Plains with courtyards and layered symmetry, and Lingnan arcades can be used to deal with commercial and residential relationships or for partial integration. There are also eclectic layouts, which cannot be summarized by a single cate-

gory method. The project team has proposed a multi-source data method based on actual needs: “laser point cloud scanning as the main body, drone oblique photography as the supplement, and close-range photogrammetry as the refinement” [3].

Using laser point cloud scanning to conduct an overall inspection of the building, the obtained spatial coordinates of each point are accurate to centimeters or even millimeters, which can fully explain the structure and space size. More complex local details, such as the ear gables, gray plastic ridges, and wood carvings on the eaves, should be processed in conjunction with close-range photogrammetry. Multi-directional high-definition images are used to calculate the model, so as to obtain digital results that are more refined than conventional surveying and mapping. UAV oblique photography reveals areas that cannot be seen from the ground, and the relationship between the entire village, the top of the building, and the natural landscape can be clearly expressed. After the three types of data are integrated according to the same coordinate system, they form a three-level digital archive of “building-village-”.

4.2 Super-resolution reconstruction and low-image restoration

Various studies related to the protection of ancient villages in western Guangdong have encountered common difficulties: many historical photos and related drawings and videos have been obviously damaged due to their age - they have scratches, uneven contrast or low resolution, and cannot be directly used for analysis or display. According to the project idea, images and videos should be “static data fields” and “dynamic data fields”. Now we need to discuss the problem of super-resolution reconstruction based on the data fields. In the processing of static images, the algorithm used constructs energy terms based on the spatial relationship between pixels at low resolution, and performs iterative optimization designs to appropriately “guess” the missing high-frequency parts without distorting the boundaries, turning blurry old photos into clearer images. As for dynamic video, it is necessary to analyze the redundancy in both time and space, perform sub-pixel registration on adjacent frames, and use multi-frame data to exceed the inherent resolution limit of a single frame. The above ideas have clear restoration value for various existing blurry images of ancient villages in western Guangdong from the 1980s to 1990s, and can be used as data requirements for visual scholarship or mass communication.

4.3 BIM+IoT preventive monitoring system

Most of the protection of ancient buildings belongs to the “post-rescue” type of approach: that is, waiting until the walls are cracked or the beams and columns are rotten before repairs are started. At this time, it is very expensive and it is difficult to determine the true state of the original building. The project team used building information models and Internet of Things ideas to design dynamic monitoring and early warning management plans for ancient village buildings.

The most important existing historical building in Wuniba Village has been equipped with micro temperature and humidity, displacement and vibration sensors in the main parts by the project team. All equipment used wirelessly collects information and uploads it to the cloud. The relevant data must be analyzed for matching with the building’s three-dimensional BIM model. The system has set safety thresholds for various indicators. If abnormal phenomena are found (such as excessive tilt of the wall, excessive humidity of wooden components, and stronger than expected earthquake vibrations), it will automatically initiate a hierarchical early warning and send the prompt content to the relevant management personnel via mobile. The mechanism thus established changes protection from “judgment” to “data-driven” and makes fundamental improvements to passive processing. According to the statistics of the project team, it can save about 30% of post-repair expenses. Remote monitoring is a particularly valuable means for remote ancient villages [4].

4.4 AR/VR immersive experience and virtual and real symbiosis

The goal pursued by digital protection is to “let more people see and understand”. The main significance of AR/VR technology is to relieve the “time and space paradox” of ancient village protection-ancient buildings cannot be moved away, but can be extended; Although the past is gone, its situation can be reproduced by simulation.

In the design of the pilot square referred to by “Hongni” in Wuniba Village, AR identification points have been incorporated into the ground pavement. When tourists scan the relevant QR code with their mobile phones, animations of historical events, videos told by old party members, or proportionally restored old styles (3D form) appear immediately. After the original murals of the ancestral hall are activated by AR technology, the performance of intangible cultural heritage such as eight tones can be given to visitors as holographic images. For those who are not in the local area, the “Wuniyun Village” applet has given a VR panoramic browsing method, so they can travel all over the village without leaving their seats, and use hot spot marks to find out the origin of relevant buildings. The above-mentioned “virtual and real symbiosis” use ideas will not damage the integrity of the architectural noumenon due to tourism, and also enable cultural resources to have a relatively sufficient opportunity to display.

5. Cultural Translation and Local Practice: The Case of Wuniba Village

5.1 Symbol Extraction and Spatial Transformation of Red Gene

Wuniba Village is a typical village listed in the “Hundred Thousands Project” in Guangdong Province. It has red culture related to the “Double Hundred” spirit, folk customs such as Anpu Eight Sounds and Dancing Eagles, as well as agricultural heritage of Lianjiang red oranges. However, according to the current research results, the cultural resources involved are basically in an “invisible” state-the deeds of the characters in the “Double Hundred” period are only verbally circulated among the elderly over 70 years old, and there are no landscape examples preserved visually; Dancing the eagle itself is not a common skill for young people. Although there are more cultural contents but less physical support, it is the key difficulty encountered in protection and inheritance.

The pilot square referred to by “Hongniu” is a complete practice of the idea of “symbol extraction-landscape transformation-digital extension”. In terms of design, cultural resources have been analyzed, and two basic symbols have been identified: “red”-that is, revolution related to red history; “Ni”-points to the geographical source of the village name. Arrange the ground of the square around the selected symbols (mainly red sandstone), so that each floor tile has a specific slogan or historical keyword, forming a “walking party history corridor”; The fancy pavement includes the seal cutting of the name of the “Wuniba” village and the five-pointed star, and uses “Red Niba Symbiosis” to explain the regional ownership. According to this logic, AR technology is used to make the pavement a digital interactive object-scanning can call up relevant historical animations, add “party history knowledge breakthrough” games, and upload personal memory narratives. Red culture is no longer just an old thing said by the old man, but a real existence of “walkable, visible, playable and communicable”. For locals, it is a point of identity confirmation, and for outsiders, it is an intuitive window to understand the region [5].

5.2 Plant Community Narrative of Ecological Memory

Wuniba Village is close to the Jiuzhou River, and the area where it is located is flooded by tides, and the soil is saline and alkaline. This state of nature is an obstacle to agriculture, but it also promotes the formation of a special ecology: the memory of growable plants and coexistence with saline-alkali land is exactly the original knowledge history of the place’s “game with nature”.

The plant landscape renewal considered by the project combines ecological restoration with cultural narratives. Selecting species from native plants, mainly saline-alkali-tolerant local tree species such as cattail peach, water weng and large-leaf olive kernel, and using “tree-shrub-ground cover” as a complex community, not only eliminates the past The sense of being dominated by one-year and two-year herbs makes the waterfront ecological zone tend to be stable. In the design, special attention is paid to using popular science commentary boards and two-dimensional codes to explain each main tree. According to this, the villagers’ memories of “the story related to this tree” can be found out-there was a business near the old banyan tree, and the peach blossoms When it blooms, it is a good time to fish, and the olive fruit is a natural object played by children [6]. The oral material in question has been filed digitally and there is a cloud-based update mechanism. From this point of view, plant communities are not only material resources used in greening, but also “living monuments” as memory carriers [7].

5.3 Closed loop of communication between physical space and cloud platform

The main breakthrough in the practice of Wuniba Village is to establish a complete closed loop around “physical experience-digital recording-cloud communication-offline return”. The digital nodes throughout the village (that is, the AR floor tiles of Hongni Square, the interactive form of ancestral hall murals, and the soundscape of the green theater) themselves belong to the source of content. Messages, old photos, and oral narratives about villagers or tourists are collected in the background and entered into the “Special Database of Ancient Villages in Western Guangdong”, and stored as digital resources in a constantly updated state. The accumulated content is re-disseminated using the “Wuniyun Village” applet and social platforms to lead possible visitors to the scene, forming a virtuous circle of “content attracts traffic, traffic feeds back and protects” [8].

The proposed approach to dealing with “cultural inheritance rupture caused by hollowing out” is a more specific approach. As far as migrant workers are concerned, cloud technology has given a number that connects their hometown: foreigners can click on the screen according to the place they remember [9], see the latest historical narratives about the village, or put the topic in the comments Send it to the elders who have not left. Digital means have partially replaced the state of population concentration in the real world, so it is possible for culture to continue to exist without interruption in a non-physical and non-immediate form.

6. Conclusions and implications

Taking Wu Niba Village of Zhanjiang City as a case, this paper makes a complete analysis of the theory and technology of digital protection of ancient villages in western Guangdong. Relevant studies have pointed out that the most fundamental difficulty in the protection of ancient villages comes from the simultaneous deterioration of “material carrier decline” and “cultural meaning aphasia”—if the building collapses, there is no memory to attach to, and the loss of memory makes the building a useless empty shell. At this time, digitalization can be used as a breakthrough: high-precision 3D surveying and mapping enables physical information to be stored reliably, AR/VR projects and cloud communication help cultural significance break through time and space constraints, and the data involved in BIM Internet of Things is the scientific basis for preventive measures. The three are used together, that is, “filing” to “dissemination” and even “maintenance” are included in the complete protection chain.

However, technology itself is only a means, not an end. As far as the practice of Wuniba Village is concerned, thinking about digital protection should draw such a conclusion: the village should not be “frozen” into a purely digital specimen, but media technology should be used to awaken the inherent contemporary vitality of culture, so that it can “survive” in the sense of identity of the villagers concerned, the knowledge of tourists and the consciousness of young people. The discussion of protection cannot stop at the limitations of “technicalism”, but must bring digital methods into the various possibilities involved in holistic cultural renewal and group mobilization. There are still some limitations in this study. First of all, the current cases are concentrated in the Zhanjiang area. Ancient villages in other cities in western Guangdong, such as Zhaoqing, Yunfu, Maoming and other places, have different cultural types and protection needs. The transferability of technical solutions needs to be further verified. Secondly, the cost and maintenance of AR/VR experience equipment are still realistic thresholds for economically underdeveloped villages. How to provide digital tools with lower cost and lower technical threshold is the direction that needs to be broken through in follow-up research. Third, the operating mechanism of the digital platform—including content review, data update, copyright ownership, revenue distribution and other issues—still needs to explore possible governance in practice. It is expected that future research can further promote the ancient villages in western Guangdong from “digital archiving” to “digital survival” on this basis, so that local culture can be truly reborn in the media age.

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