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Exploring the Living Conservation of Pingyao Ancient City's History and Culture with a Focus on Landscape Memory

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Abstract: This paper discusses the application of traditional architectural restoration techniques, dynamic maintenance of the spatial texture of historical streets and alleys, the construction of a digital monitoring system for building facades, and spatial transformation strategies for the continuity of residential functions. Through the integration of traditional construction techniques with modern technologies, such as dynamic monitoring, evaluative tools, and digital management systems, this approach seeks to sustain the landscape memory and preserve the historical and cultural continuum of ancient cities, while simultaneously balancing the conservation of heritage architecture with the functional demands of contemporary urban life.

Keywords: Landscape memory; Pingyao Ancient City; History and culture; Living conservation

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1. Introduction

As a world cultural heritage site, Pingyao Ancient City carries the glorious memory of the Jin merchant culture of the Ming and Qing dynasties, and its complete ancient building groups and traditional street patterns are precious historical and cultural resources. How to continue the landscape memory in living conservation, which not only keeps the historical and cultural roots of the ancient city but also adapts it to the development needs of modern society, has become an important issue to be solved urgently. This paper focuses on the theory of landscape memory and centers on the architectural characteristics of Pingyao Ancient City to discuss the strategy of living conservation of history and culture, aiming to provide scientific and effective solutions for the sustainable development of the ancient city.

2. Conceptual narrative

2.1. Concept of landscape memory

Landscape memory refers to the shared cultural memory rooted in the combination of physical spaces and intangible heritage within a particular region. It is expressed through tangible elements such as buildings, streets,

and natural surroundings, while also conveying deeper meanings related to historical events, local customs, and cultural values. Through spatial layout, color, texture, and function, landscape memory helps preserve and communicate the unique identity and cultural depth of a place [1]. It not only preserves traces of past life but also gains new meaning over time, serving as an important source of local identity and cultural belonging. It plays a key role in shaping regional cultural identity and ensuring the continuity of cultural heritage.

2.2. Concept of living conservation of history and culture

Living conservation of history and culture is the concept of protecting and inheriting cultural heritage with a dynamic and developmental perspective based on respecting historical authenticity, breaking through the traditional static conservation mode [2]. This type of protection focuses on the interactive symbiosis between heritage community and environment, allowing historical culture to be revitalized through continuous use, inheritance, and innovation, realizing the organic unity of cultural, social, and economic values, and ensuring sustainable development of historical and cultural heritage in contemporary society [3].

3. Living conservation of historical and cultural heritage in Pingyao old town, focusing on landscape memory

3.1. Application of restoration techniques for the authenticity of traditional buildings

A large number of buildings from the Ming and Qing dynasties exist in Pingyao, which not only carry historical information but also contain unique construction wisdom and regional craftsmanship. In the process of restoration, the principle of "raw materials and original technology" should be followed, and local traditional materials such as green bricks and tung oil mortar should be used for the damaged brick and wood structures [4]. In the repair of wall cracks, the use of loess, glutinous rice paste, and lime mixed in a specific ratio of traditional mortar, this material and the original wall material compatibility, not only effectively repair cracks, but also maintain the appearance of the building the rustic texture [5].

For the problem of decay of wooden components, priority is given to the use of the same type of wood as the original wood species, using mortise and tenon structure to replace the damaged parts, to ensure that the repaired part and the original structure are integrated [6]. Actively uncover and preserve local traditional construction techniques by involving experienced craftsmen familiar with Pingyao's traditional building methods in restoration efforts. Their knowledge should be translated into practical technical guidelines and documented through written and visual materials to guide future restoration work. This approach ensures the authentic continuation of traditional architecture and helps prevent the loss of historical information caused by the inappropriate use of modern materials and methods.

3.2. Dynamic maintenance of the spatial texture of historical streets and alleys

The network of streets and alleys in Pingyao Ancient City, consisting of four main streets, eight side streets, and 72 centipede alleys, is an important manifestation of its unique spatial texture. To preserve the original spatial texture of historic streets and alleys, it is important to trace their historical development using archival maps and documents, clarify their functional roles and spatial relationships, and develop a dynamic maintenance plan accordingly [7]. For the direction and scale of streets and alleys changed due to historical changes, the original historical appearance will be gradually restored under the premise of not affecting modern transportation and residents' lives. Emphasis should be placed on preserving the courtyard layouts and axial relationships characteristic of traditional Pingyao architecture. The traditional courtyards in Pingyao are mostly laid out symmetrically on a central axis, with spatial hierarchies created through architectural elements such as shadow

walls and hanging flower gates [8].

In daily maintenance, new construction and alteration projects around the courtyards are strictly controlled to ensure that their heights and styles are coordinated with those of the original courtyards and that they do not destroy the original spatial order. For the spatial deformation of courtyards caused by age and disrepair, a progressive restoration method is adopted to restore the original form and spatial relationship of the courtyards by reinforcing the foundation, adjusting the inclination of the walls, and other measures [9]. Additionally, a dynamic monitoring system is established to regularly assess key spatial indicators, such as the scale of streets and alleys and the spacing between courtyards. This system enables the early detection and timely resolution of emerging issues, thereby safeguarding the stability and continuity of the historical spatial texture.

3.3. Digital monitoring system for building façade appearance

The building facades of Pingyao Ancient City are richly decorated with exquisite brick, wood, and stone carvings, which are important visual carriers of its history and culture. Using three-dimensional laser scanning technology, the facades of key buildings in the ancient city are scanned with high precision to obtain data on the geometric dimensions and decorative details of the building facades, and a three-dimensional digital model is established [10]. Using high-resolution photogrammetry technology, the color and material information of the building façade is captured to achieve an all-round digital record of the building façade [11].

Building on this foundation, a dynamic comparison mechanism is established to conduct regular scanning and data collection of building façades. The newly acquired data are systematically compared with the original digital models to detect subtle changes, such as wall spalling or damage to decorative elements, at an early stage. When such issues are identified, the system automatically issues early warnings and offers corresponding repair recommendations [12].

By integrating the digital monitoring system with the daily inspection operations of the management department in the ancient city, the system allows for real-time uploading of identified issues during inspections via mobile devices. This facilitates seamless online and offline management, enhancing the timeliness and effectiveness of building façade preservation efforts. Moreover, it provides scientific data support and technical assurance for the long-term conservation of the building façades in the ancient city of Pingyao.

3.4. Space remodeling strategy for the continuity of residential functions

In the process of spatial transformation, traditional architectural forms should be preserved to the greatest extent possible while meeting the needs of modern life. The “four big and eight small” courtyard layout and kiln-cave architectural features of Pingyao’s traditional houses are important cultural symbols. In the renovation, the strategy of “changing the interior without changing the exterior” can be adapted to reasonably optimize the interior space without changing the appearance and overall structure of the building [13]. To address issues of inadequate lighting and poor ventilation in traditional houses, the indoor environment can be enhanced by installing skylights and optimizing the placement of doors and windows. In renovating functional spaces such as bathrooms and kitchens, embedded and modular modern facilities are utilized to meet residents’ needs while minimizing disruption to the original architectural design [14].

In the case of insufficient living space, additional buildings of lightweight steel structure can be erected in the courtyard, a form of construction that does not affect the overall appearance of traditional courtyards, but also provides additional space for use [15]. Residents are encouraged to participate in the renovation process, and the living habits and actual needs of residents are fully respected, so that the renovated living space can adapt to modern lifestyles and continue the traditional living culture, to realize the sustainable development of the living

function of the ancient city of Pingyao, and to make the ancient city still full of vitality and vitality of life in the new era.

4. Conclusion

The above analysis demonstrates that adherence to the principle of "using original materials and techniques" has effectively preserved the historical knowledge and craftsmanship of building construction. The dynamic maintenance of the spatial texture in historical streets and alleys has ensured the stability of the ancient city's spatial order. The development of a digital monitoring system for façade preservation, coupled with the application of modern technology, has enabled precise monitoring and timely maintenance of building exteriors. Furthermore, these efforts have successfully maintained the continuity of living spaces. A digital monitoring system for façade preservation has been established, leveraging modern technology to enable precise monitoring and timely maintenance of architectural exteriors. The continuity of residential functionality is achieved through "internal and external modifications," which strike a balance between preserving traditional architectural forms and accommodating the needs of modern living.

Disclosure statement

The author declares no conflict of interest.

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