The Integration Mechanism of Ancient Architecture Protection and Modern Construction

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Abstract. Being a carrier of history and culture, the ancient architecture is of great significance and worth protection in many aspects. However, in the process of modern urban construction, those buildings are facing the risk of being deserted and abandoned. At present, an important way to protect ancient architecture is to integrate them with modern construction. Taking Chengdu, Leshan and Xi’an City as examples, this paper attempts to solve the contradiction between ancient architecture and modern construction, proposing a feasible integration mechanism. According to the study, ancient architecture and modern construction have commonalities in culture and aesthetics, but have contradictions in economic and social aspects. Specific problems include lack of talent, inadequate supervision of capital flows, lack of security of cultural relics, and conflicts in urban style. This paper first clarifies the protection concept of ancient buildings, that is, to protect its cultural style and develop after protection. Secondly, this paper also proposes solutions to the problems found. Economically, the interest of architects and the level of supervision of restoration engineering funds need to be improved. In the social aspect, cultural relics can be ensured by improving policies and other means.

1 Background of ancient architecture protection

1.1 Value of ancient architecture

Chinese ancient architecture is a combination of feng shui, philosophy, art and technology. It has significant value in many aspects and its protection is of great importance.

First of all, Chinese ancient architecture is a carrier of history and culture in ancient China and has important historical and cultural values. Through the architecture, we can understand the traditional culture and customs of the old times. Secondly, compared with the restoration model, the genuine buildings have a more significant cultural communication function, which can reflect the mainstream artistic concepts of different eras. This is an important reason for the restoration of ancient buildings. The architectural features of each era reflect the mainstream aesthetic trend at that period of time. For example, the Hanyuan Hall of the Daming Palace from the Tang Dynasty has a width of eleven rooms, about 75 meters. The two sides are slightly ahead, and there are two pavilions of “Xiangyu (flying phoenix)” and “Xifeng (resting phoenix)”. A passage in the shape of a ruler connects the Hanyuan Hall 1. This embodies the aesthetic tendency of the Tang Dynasty – “the more magnificent, the more beautiful!”. Once again, the value of science and technology is also embedded in the clever design of ancient architecture. The representative design known as the arch can bear the weight between the column and the beam, so that the building can be supported without a screw, which reflects the design level of the building structure at that time. In addition, ancient buildings have important commercial value, mainly in the traditional cultural industry (shown in Figure 1). In China, most of the ancient buildings that have been protected and developed have been transformed into traditional cultural tourism, which has driven the development of local economy. There are two main ways to gain profit: to sell tickets, such as the Mausoleum of the First Qin Emperor in Xi’an, and to open shops for commercial operations, such as the Jinli ancient street in Chengdu.

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The analysis above shows that it is necessary to protect ancient architecture. At present, an important way to protect the architecture is to integrate it with modern construction. This is because buildings play different roles in different cultural contexts, and cultures change over time, making some buildings lose their original use and face the risk of being replaced. As ancient architecture being given a new meaning in modern society, the protection of it is no longer a problem. However, this method faces the contradiction between economic construction, cultural relics safety and urban features in ancient architecture and modernization. The process of modernization is unstoppable. If we cannot resolve these contradictions in time, there will be more ancient buildings facing the fate of being finally dismantled and abandoned. Therefore, this paper attempts to start from the relationship between ancient architecture and modern construction, taking Chengdu, Leshan and Xi’an as examples, to analyze the integration mechanism between ancient architecture and modern construction, so as to realize the protection of ancient buildings.

1.2. Research on ancient architecture protection

Graded protection is the main feature of Chinese ancient architecture protection. According to Article 3 of the Chinese Cultural Relics Protection Law, immovable cultural relics like ancient cultural relics, ancient tombs, ancient buildings, cave temples, stone carvings, murals, modern important historical sites and representative buildings etc. can be identified as major historical and cultural site protected at the national level, provincial level, or city and county level according to their historical, artistic and scientific values. Historically, movable cultural relics such as important objects, works of art, literature, manuscripts, books, and representative objects, etc. can be divided into precious cultural relics and general cultural relics, and precious cultural relics are divided into first-level, second-level, and third-level relics.

At present, most of the research topics on ancient architecture revolve around the structure and materials of ancient buildings and restoration. The former focuses on the study of the structure of ancient buildings from the perspective of physics, providing basic knowledge for other studies. Scholars from China and Japan such as Fang Dongping, Yu Maohong, Miyamoto Yu, Iwasaki Masaki, and Yan Banxi (2000) conducted experiments on the Xi’an North Gate Embrasured Watchtower in the “Experimental Study on the Structural Characteristics of Ancient Wooden Structures”. They figured out a test method for obtaining the basic dynamic characteristics of wood-framed buildings. 2. Wei Guo’an (2007) analyzed the mechanical properties of the arches of wooden structures in ancient buildings and numerically calculated them using the ANSYS program. 3. Chen Zhiyong (2011) studied the Yingxian Wooden Tower and analyzed the structural characteristics of it through on-site investigation and experiment. 5. Most of the topics related to the restoration of ancient buildings can be divided into three directions. First is the restoration technology, focusing on how to use modern technology to restore the appearance of the building. Liu Xuchun and Ding Yanhui (2006) discussed the problems faced by 3D laser scanning technology in the restoration of ancient buildings and discussed how to apply them to the protection. 6. Xiang Yao (2007) studied the virtual color restoration technology of ancient buildings, and proposed three migration algorithms that can be applied to different fading and discoloration conditions. 7. Zhang Fan (2010) combined the theory of repair and practice, conducted qualitative and quantitative research based on the classification of building materials, and evaluated the adaptability of different repair techniques. 8. The second is the restoration concept of ancient buildings. Wang Guixiang (2008) integrated the existing restoration concepts of ancient buildings, which are usually divided into traditionalism, classicism and historicism. Traditionalism focuses on inheriting and modeling on the details of ancient architecture, giving professional academic training to students, and treating ancient architecture rigorously. The principles of classicism are consistent with those of ancient Greece and Rome, emphasizing the regularity of classical architecture. Historicism emphasizes the outlook and style of architecture. 9. Li Ling (2011) put forward the concept of harmony in ancient architecture, and believed that architecture should maintain a balanced relationship among people, environment and society. Therefore, we should inherit ancient architecture with judgement and development. The third is the industrialization of ancient buildings. This type of research topic is related to the topic of this paper. However, most studies only discuss the development of tourism. For example, Zhu Jia (2006) used Tengchong and Shungu Town as examples to study how to develop the ancient building tourism industry “in protection”. 11. Luo Yubin (2010) proposed a protection strategy for urban and rural integration, coordinated development, and establishment of cultural
industries in response to the destruction of the historical and cultural villages and towns of the Pearl River Delta. Zheng Huan (2013) carried out research on the protection of ancient buildings and the development of sustainable tourism, taking Huizhou ancient architecture as an example to discuss the development model of ancient architecture tourism, and seeking the balance point between protection and utilization of ancient buildings. In addition, only a few of the topics have systematically studied the ancient construction industry. Du Wenting (2016) systematically explored the ancient architectural culture industry from the perspective of stakeholder theory, and provided powerful academic guidance for the development of the ancient architecture industry in the process of modernization.

In summary, except for a few studies that discuss the industrialization of ancient architecture, most of the research only solves the method of restoring the building, without further discussion on how to redefine the restored buildings and their uses in contemporary society. The integration of ancient architecture and modern construction is still an area that needs to be studied. Therefore, this paper will solve the contradiction between ancient architecture and modern construction from the three perspectives of culture, economy and society, and explore a feasible integration mechanism.

2 Relationship between ancient architecture and modern construction

Ancient architecture and modern construction have common points in culture and aesthetics, but there are contradictions at the economic and social levels.

2.1. Integration

Ancient architecture and modern construction have the inevitability of integration at the cultural level. Ancient buildings that are integrated with religious culture can often be preserved for a longer period of time. For example, the famous Leshan Giant Buddha, due to its close integration with Buddhist culture, has been relatively well-repaired. Posters promoting modern Buddhist culture on modern architecture reflect the rich Buddhist culture of the region. European ancient architecture is more deeply influenced by religion, and many landmark buildings are also related to religion, such as the Notre Dame de Paris in France. These ancient buildings can still maintain their status in the process of modernization in Europe. It can be seen that the spiritual connotation of ancient architecture is influential, and the value in cultural level can closely link ancient architecture with modern construction.

The traditional aesthetics of ancient architecture can also be used in modern architectural design. And pseudo-classic architecture is the embodiment of the fusion of the two. For example, the Broad and Narrow Alley in Chengdu used black bricks and other elements to reflect the characteristics of traditional West Sichuan-style dwellings. It combines the features of ancient buildings with the practicality of modern design to improve but not restore ancient buildings.

2.2. Contradiction

The development of modern industrialization has brought threats to the restoration of ancient buildings, mainly reflected in the shortage of talents and the lack of supervision of capital flows.

Lack of talent has become a major problem in the protection of ancient buildings. The industrialization of ancient buildings has made ancient construction projects aim for profit. But without commercial development, it will be difficult for the ancient construction industry to attract talents by the meager profits of the project. At present, because the ancient architecture has become an unpopular major in the university, some university has even canceled it. For example, Sichuan University, which is listed in the "Project 985", does not have a specific ancient architecture major. This phenomenon further reduces the opportunities for students to come into contact with ancient buildings, forming a vicious circle of sources of talents. Among the three major design institutes in Chengdu (Southwest China Architectural Design Institute, Sichuan Provincial Architectural Design Institute, and Chengdu Architectural Design Institute), after the retiring of the knowledgeable experts, new talents are needed to continue their work. Since the design and research work of ancient buildings needs rich professional knowledge and has high requirements for talents, the source of talent for ancient architecture is a key issue.

The regulatory issues of capital flows have also affected the restoration of ancient buildings. Although the state spent a lot of money on restoration, the lack of management of the flow of funds led to poor construction results. According to the National Bureau of Statistics, as of June 2018, the central government has invested a total of 5.3 billion yuan in intangible cultural heritage protection. In 2018, the budget was 1.8 billion yuan for traditional village protection. (According to the policy of classification of cultural relics protection in China, national level will be given key protection, following by provincial and municipal levels etc.) However, due to the industrialization of ancient architecture, the government has not strictly monitored the flow of funds and the construction projects are also uncertain. Therefore, after the repair cost exceeds the budget, the engineering team will not be able to complete the work with defined quality, and the final repair effect will not be as expected.

Ancient architecture and modern construction have also created conflicts on cultural relics and urban style. With the development of the industrialization of ancient architecture, some pseudo-classic buildings have been put...
into use in business and tourism. Some of the merchants have privately remodeled the original building in order to increase profits. For example, the Old Stove Hot Pot in Chengdu’s Broad and Narrow Alley privately added more layers, which increase the potential danger of the building. At the same time, cultural industries (such as tourism) make people have more frequent contact and closer connection with ancient architecture. If the law for the preservation of antiques is not strictly implemented, tourists will also cause damage to cultural relics. Modern high-rise buildings also have a negative impact on the style of ancient buildings. The Leshan Confucian Temple was once known as “watching the Mount Emei”. Since ancient times, many Chinese poets have created eternal poems depicting the mountains in the temple. But today, modern skyscrapers have blocked people’s views and destroyed the original features of ancient buildings.

3 How to achieve the integration

3.1. Cultural perspective — Study of the concepts of ancient architecture protection

The ancient Chinese architecture should aim at protecting its style and develop through protection, thus realizing the integration of ancient architecture and modern urban construction. Since the spiritual connotation is the embodiment of the integration of ancient architecture and modern construction, the spiritual features of ancient architecture should be restored as much as possible. There are two possible ways to protect the style. The first is to restore the unique details of the building. For example, the ancient buildings of the Tang Dynasty believe “the more magnificent, the more beautiful”. So, their restoration should make sure that the pillars and fences are not too thin, and the doors are not too narrow. The second is to ease the contradiction between ancient architecture and modern construction by transforming and isolating ancient buildings. How to design specifically should be analyzed according to different geographical conditions. For example, Leshan’s Confucian Temple and Mount Emei are inseparable. So, in the planning of modern cities, it is possible to avoid conspicuous tall buildings between them. Another way to design a transition zone is to build a green belt. It can not only block some modern buildings with different styles, but also protect the environment.

“Develop after protection” refers to the development and utilization of ancient buildings under the premise of protecting ancient buildings. Italy is one of the countries that have done the best in the protection of historical and cultural heritage. It has achieved great achievements in the restoration technology, legal system and urban planning of ancient buildings. Italy has always regarded “the best protection is to put into use” as the ancient architecture protection concept, which reflects the importance of developing ancient architecture after protection. It also shows that “develop after protection” is an effective measure for the integration of ancient building and modern city.

3.2. Economic perspective – Regulatory of the source of talents and the flow of funds

3.2.1. Research on the source of talents

Lack of talent is composed of two factors: industrialization and low profitability. Protecting the interests of architects is the main solution. Ancient buildings that have not developed into tourist attractions will not bring benefits to the architects after the restoration. Therefore, the government needs to provide income protection for the architects and ensure their benefits in the research, design and restoration work. If ancient buildings are developed to tourist attractions and generate economic benefits, architects should also benefit from them. In the “stakeholder theory” mentioned in the literature review, most scholars regard tourism companies, government, and residents as stakeholders, and discuss how to balance the interests of the three. However, the interests of the architects have therefore been ignored. If architects can make a profit in the tourism industry, their income sources will not only be limited to construction projects, thus attract more people to understand, learn and engage in this career.

3.2.2. Research on the flow of funds

[1] Nepal’s regulatory system

Nepal has a strict regulatory system for the flow of funds for building repairs. For buildings damaged after the earthquake, the government will clearly specify the use of each part of the money. For example, the government will first give the engineer a small amount of funds for the foundation. The foundation work will then be checked by the architect of the government department. Only when the work is qualified can the engineer get another part of the funds for the next stage of work. If the test fails, the part of the work needs to be redone. Since the project is strictly matched with the progress of the project, the opportunity of reducing project cost to increase profit is reduced. Such a policy can effectively monitor the flow of funds and prevent the engineering team from wasting money, but it also increases the workload of the government. China can learn from such policies, strictly regulating the specific use of funds with supervision, and try to ensure that funds are used to the maximum in projects.

[2] Russia’s regulatory system

Russia has a strict management system for the protection of ancient buildings. Any work related to the restoration of ancient buildings needs to be approved and reviewed by relevant departments. According to the Russian Federation Law, the application for the ancient architecture project must be approved before the design.

5 Source: LI Yalin, senior antient architecture engineer
6 Source: LI Yalin, senior antient architecture engineer
7 Source: Urban Planning Bureau of Kathmandu, Nepal
institutes can design and organize the construction group. The design institute will submit the design to the management committee, and apply for the construction permission after having an expert discussion meeting and getting the license from the committee. The designer is the direct responsible individual for repair and protection and will be responsible for supervision. During the construction, the management committee will send people to counsel and inspect the engineering work from time to time. After the construction is finished, the management committee will once again inspect the ancient buildings. Only qualified projects can apply for the licenses of other departments 17. Russia’s management system can also effectively ensure the quality of the project and guarantee the restoration effect of ancient buildings. China can learn from Russia’s rigorous regulatory system and review and evaluate every piece of work.

3.3. Social perspective – Safety of cultural relics

To ensure the safety of ancient architecture, the following three points need to be achieved:

First of all, the most direct way is to improve the cultural relics protection system in the tourism industry. Since some cultural industries bring potential dangers to cultural relics from tourists, strict policies should be enacted to provide legal protection for ancient buildings.

The architect’s authority over ancient buildings should also get increased. In the cultural industry, the harm from merchants to ancient buildings is also severe. The power to design and construct ancient buildings should be given to architects and engineers, and the government should supervise the process. If the merchant wants to renovate the building, all the renovation work should be approved by the architect first, and then the relevant government departments. Finally, the construction should be under the supervision of the architect and the government, so as to avoid the damage from renovation.

At the same time, the architects will also bear corresponding responsibility for the ancient buildings. Architects need to ensure the safety of ancient buildings in order to avoid improper deals between architects and businesses, non-compliance with professional ethics, and unscientific architectural design. If the building is damaged twice after alteration and is caused by architectural design rather than human factors, the architect will be responsible for the damage to the ancient building.

4 Conclusion

Ancient architecture protection is an ongoing work. In order to protect ancient buildings for a long time, it is an indispensable way to integrate them with modern construction. This paper takes Chengdu, Leshan and Xi'an as examples to discuss the integration mechanism between ancient architecture and modern construction.

Firstly, this paper analyzes the relationship between ancient architecture and modern construction, finding out that they have commonalities in culture and aesthetics, but are contradicted in economic and social aspects. Therefore, solving the contradiction will effectively integrate ancient architecture and modern construction.

The economic problems faced by the industrialization of ancient architecture are the lack of talents and the lack of supervision of capital flows. This paper proposes feasible solutions to these two problems. First, the interests of architects engaged in the study and design of ancient architecture can be divided into two categories of commercial and non-commercial. This classification based on whether the ancient buildings that the architects are responsible for is finally developed into tourist attractions. The former should benefit from the tourism industry and have certain rights to the design and renovation of the building. The government needs to take responsibility for the latter’s income and protect their source of income. Second, in the process of restoration, the flow of funds needs to be protected by regulatory policies. Nepal’s way of distributing funds in a step-by-step manner and Russia’s strict regulatory system are particularly worth learning.

In view of the issue of the safety of cultural relics, this paper proposes three measures. The first is to improve and implement the cultural relics protection system. The second is to increase the architect's authority over over-commercialized ancient buildings. And the third is to increase the architect's responsibility for the safety of ancient buildings.

The process of industrialization is unstoppable. So, for the cultural industry, the most important thing is to pay more attention to the balance between business and culture and to follow the concept of ancient architecture protection. Realizing the integration of ancient architecture and modern construction also means to find a balance point in the process of industrialization. To this end, we still need to constantly improve and develop, so as to protect ancient architecture for long.

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