

# Study on Yantai's Historic Buildings Conservation and Its Sustainable Development

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**Abstract**—Through a series of studies on the form, structure, decoration and environment of Yantai's historic buildings, in connection with the examples of protecting them, this paper deemed that Yantai's historic buildings were of feasibility for developing tourism and in-depth exploiting tourism resources, and probed into the development mode on promoting the protection of the historic buildings at Yantai through tourism. Then this paper described the current status of the historic buildings in Yantai and analyzed the main problems and contradictions in how to protect and utilize them. Finally, the sustainable tourism development concept would be taken as guiding ideology, with digital technology as a means of protection, to solve problems in the tourism development and protection of historic buildings, while setting up a "three-in-one" (government, residents and tourists) sustainable tourism development mode, providing relevant reference and research value to develop historic buildings tourism and enriching the historic building protection and sustainable tourism development research in our nation.

**Keywords**—historic buildings; protection technology; tourism development

## I. INTRODUCTION

With artistic value, historical value, scientific research value, the historic buildings are an important historical heritage and material wealth of mankind. Under specific historical conditions, they created rich and colorful artistic images through the accumulation, absorption and innovation of different artistic expression forms, in particular, the characteristics of formative arts such as painting, sculpture, arts and crafts, etc. As an important part of historical and cultural heritage, they carry a profound history and contain a wealth of cultural value as well.

In recent years, however, the review of the ancient building value has not helped it to get rid of its fate of being destructed by both the nature and man-made. The nature here refers to the influence incurred from natural disasters, such as earthquakes, tsunamis, etc. The human factors here refer to protection, lack of funds, over exploitation, etc. In addition, the survival of ancient buildings also depends on the collision between "new" and "old", the game of "demolition" and "protection".

In the protection and utilization of ancient buildings, the ancient architecture tourism development maintains a good and rapid momentum, attracting more and more tourists to

come to visit and study them. The ancient architecture tourism, on the one hand, drives the development of local economy; on the other hand, it deepens the understanding of the government, local residents and stakeholders about protection, development and utilization of the ancient architecture. However, in contrast to the booming development of ancient architecture tourism, the contradiction between the protection of ancient buildings and the development of tourism is increasingly prominent, such as over-developed, over-utilized tourism, out-of-date historic building protection technology, lagging of the sustainable development theoretical research on the historic building tourism, etc. These all are factors threatening the sustainable utilization of historic buildings.

## II. THE RESEARCH STATUS OF HISTORIC BUILDINGS IN YANTAI

At present, the research on ancient architecture in China is mainly focused on its value cognition, resource utilization, studies on regularity of visits, tourism influence, protection and planning. Few people have made studies of "protection" and "development" as an organic whole. The accelerated urbanization process has brought unprecedented impact to historic buildings. The research of scholars and the exposure of the media have made people begin to realize the necessity and urgency of the protection of historic buildings. Various countries are trying best to protect historic buildings and explore protection methods to take historic building protection into a scientific way.

The Yantai area, due to its long history and its convenient maritime transport, has a large number of historic buildings in diverse styles. The protection of historic buildings not only can showcase the cultural connotation and artistic characteristics of historic buildings in our nation, but also can turn cultural advantage into industrial advantage through tourism development, and form a cultural industry brand with regional characteristics through sustained protection and development.

In term of architectural history and cultural study value, the historic buildings in Yantai boast abundant connotation and profound artistic conception. They vary by artistic conception, and can make visitors recall the history and get different feelings and ideas. There are differences in hierarchy, regional characteristics, history and culture, and

local structure, etc, so that different buildings have different characteristics.

For the development and utilization of tourism, in Yantai area, there are not only historic buildings with a certain brand influence, such as Penglai Pavilion historic monuments, but also there are some which are still in development phase, such as Mous Manor in Qixia, and some which have not been fully developed and utilized, such as Ding Family Mansion in Longkou, Fujian Guest House in Yantai, Golden Temple in Laiyang. In a comprehensive view, for the historic building tour in Yantai, the tourism is only limited within the development and utilization of a single scenic spot. The sustainable use and development with the characteristics of Yantai have not yet been formed.

Through the research of this topic, first, the digital data archive of the historic buildings in Yantai shall be set up as top priority so as to facilitate the establishment of Yantai's ancient building digital information model. Second, the sustainable development is taken as guiding ideology to promote the economic development mode of Yantai's historic building tourist culture, to take the protection as development to provide quality tourism resource value, to form sustainable conservation of historic buildings through sustainable development so as to shape a good recycling economy development model.

### III. THE ANALYSIS OF THE FEATURES OF YANTAI'S HISTORIC BUILDINGS

#### A. Penglai Pavilion

The main building of Penglai Pavilion was built in the reign of Emperor Jiayou of the Northern Song dynasty. The pavilion is 15 meters tall, facing to the south. It is a two-tier wooden structure, with an open corridor encircling it for visitors to climb for overlooking. It is the best place to appreciate fantastic mirages. After it was reconstructed in the Ming Dynasty and the Qing Dynasty, it looks more magnificent and spectacular. In front of the pavilion there are green pines and flowers. The green tiles appear among the green trees to please visitors.

Penglai Pavilion consists of six large buildings, namely, Lvzu Hall, San Qing Taoist Temple, Penglai Pavilion, Temple of the Queen of Heaven, Dragon King Palace and Temple of Amitabha. The pavilions, terraces and towers are scattered at different height to form the historic monuments of the Han Nationality with a clever layout, unique style, like nature itself. Most of the ancient buildings in Penglai Pavilion were built by the local people themselves without the restriction from the authority. It is famous for its solemn and simple nature. With more simplicity and less ornaments, this pavilion has formed its unique architectural style.

#### B. The Mous Manor in Qixia

The Mous Manor began to be built during the reign of Emperor Yong Zheng of the Qing Dynasty and was basically completed in the 24th year of The Republic of China. The manor is seated near the mountain and by the river, facing the south. It is a brick-timber structure with flush gable roof

and slope crest. To overlook the whole manor, the layout is three groups and six courtyards, each group varying from one courtyard to three courtyards, all in quadrangle courtyard structure. Many houses are made with carved beams and painted rafters, and lattice windows. So the manor is magnificent. The three courtyards "Ri Xin Hall", "Xizhonglai" and "Dongzhonglai" are side by side from north and south. Each courtyard is made of four-to-six quadrangles, conned by a central door, with a paved path running through them. The main house has a door in its center, with wing-rooms on either side. The quadrangle courtyards in the manor are overlapped orderly. The houses density is well-arranged, showing exquisite workmanship and simple modeling. The manor not only presents typical characteristics of the traditional residence architecture in China's north, but also shows the luxury of Mou family.

#### C. Yantai Fujian Guest House

Consisting of a gate, Da Fu Hall, Rear Hall, an opera stage and wing-rooms, this guest house is 92 meters long from south to north and 39 meters wide from east to west, covering an area of 3500 square meters and a floorage of 1459 square meters. All bricks, tiles, wood and stone were selected in Quanzhou, Fujian province, and carved and painted there and transported to Yantai. The main gate is a tall wood-stone structure building, with a side-door on both sides and two side rooms, with a height of 10 meters, supported by 14 plinths. The roof is supported by beautifully decorated brackets covered with blue glazed tile. On the ridge there are some decorations in a shape of dragon. The ridge porcelain plates are painted with flowers, animals, portraits of beautiful women. To the south of the gate is the main hall, which is the main building of the palace of the Queen of Heaven. It stands on a high platform with stone base, with finely-carved square stones and bricks as bearing wall. The guest house has gable and hip roof with 12 supporting columns, and carved beams. On the ridge there are some decorations in a shape of dragon. It is as spectacular as the main gate. In the hall, there is the statue of the Queen of Heaven.

#### D. Ding Family Mansion in Longkou

The Ding Family Mansion in Longkou City is the former residence of the Xiyuelai branch of "Millionaire Ding" family. The mansion is composed of Aifu Hall, Lvzu Hall, Baosu Hall, Chongjian Hall on the four routes, and Linshufang Garden, a private garden of Qing Dynasty. The mansion was built in the middle period of the Qing Dynasty, with its architectural style having a strong romantic charm of the capital mansion and dwellings in east Shandong. The central axis of each route is symmetrical in layout. It consists of five quadrangle courtyards; with timber frame structure, flush gable roof and slope crest. The roof surface is covered with scale grey-green tile. The main building is of fine workmanship and choice materials, with five ridges and decorations in the shape of animal, carved and painted beams. There are a front porch and a rear porch. This mansion can be referred to as the essence of dwelling architectural art.

#### IV. THE EXISTING PROBLEMS IN THE PROTECTION OF HISTORIC BUILDINGS IN YANTAI

##### A. *The Problems Such as Overdevelopment and Commercialization are Very Serious*

At present, the protection and development of historic buildings in Yantai is mainly based on tourism development, which is not supervised strictly and has ambiguity of power and duties. Thus, it is easy to turn historic buildings into a ready source of money for tourism operators, who maximize commercial benefit under the protection. For example, the organic composition of Penglai Pavilion historic monuments has too many commercial facilities, which spoil the overall image of Penglai Pavilion historic monuments. The travel experience, which should be pleasant and rich historical and cultural knowledge, has been changed into bargaining transaction. Virtually, the overall value and customer satisfaction are reduced.

##### B. *Big Difference in Protection Degree, a Single form of Tourism Development*

The existing historic buildings in Yantai vary to the popularity of tourism development, so the protection degree differs sharply. For example, Penglai Pavilion scenic tourist area, the most famous historic building in Yantai, takes an annual reception of 2 million person-time, while Mous Manor in Qixia is not so famous even though being the North's largest landlord manor, and receives less tourists naturally. There are many historic buildings at the city protection level, such as Ding Family Mansion in Longkou and Golden Temple in Laiyang. They are not yet developed due to the limited input by government. The protection degree is very low. Even for the famous Penglai Pavilion historic monuments, the ticket proceeds are main income, and less cultural landscape of Penglai Pavilion area, related to immortal legends and Taoism culture, has been exploited. The natural landscapes, such as the demarcation line between the Yellow Sea and the Bohai Sea, the mirages, etc., are developed only on the surface. How to allow visitors to get pleasure in experiencing value is a focus in developing scenic spots, rather than hurrying them up to visit scenic spots them one by one

#### V. PROTECTION MEASURES FOR HISTORIC BUILDINGS IN YANTAI

##### A. *Setting up a Digital Information Model of Historic Buildings and a Digitalization Data Chain*

Take digital technology as a means to establish a Yantai's historic buildings BIM information model protected by digitalization. To establish a 3D parameterized model, first of all, we should analyze its structures and study those characteristics which can better express the feature of the historic buildings. Meanwhile, we need to pay attention to the model construction fineness and the normal operation of computer. Most of the historic buildings in Yantai are those from the Ming and Qing Dynasties, and are in uniform style in such aspects as architectural structure and form, materials, technology, etc. By studying the characteristics of the

historic buildings, such as modular system, standardization, the described parameters can be simplified much more.

The plane layout of historic buildings in China is usually established on "one room" as a unit. The courtyard, as a unit, makes up building clusters in multiform. The structure is timber frame system. Columns and beams are basic stress system. Through the study of the integration features of Yantai's historic buildings shape and structure, we put forward to establish a 3D component library system which is commonly used for historic buildings, using dou-kou modulus as modulus of foundation.

After we looked up a lot of the information on Yantai's historic buildings, we carried out layer- management on their components as per six kinds such as base, column, enclosure, brackets, beam and roof. The size and structural characteristics of the components of each kind were summarized and handled in unification. Also we began to set up a component physical dimension parameter database. The digitalization modeling of the historic building components in Yantai was set up after we made an in-depth study of its composition system and constitution. The historic building 3D model information includes not only the basic information such as the material, the age and the painting of the component, but also the data such as the length, width, height, volume and insertion point of the component. The model information was stored as per several aspects, such as structure, material, oil painting and so on to shape a complete a historic building information model life cycle.

##### B. *The Historical and Cultural Experience-Based Ancient Architectural Image of Yantai*

Emphasis is given to the participation of the people, spontaneity and interactivity so as to bring government, tourists and in the participation to share the historic building tourism culture industry resource value. We must pay attention to the idea of local residents about the protection of historic buildings and understand existing problems. For developing the area and environment of historic building into tourism resource, we should give full consideration to the local residents' right to speak so as to allow neighboring residents to share the benefits from the protection of ancient buildings. The passive protection shall be turned into active protection so as to provide a good foundation for the tourism development.

The digitization construction of Yantai's ancient buildings will not only digitize the ancient building entity itself, but also should get involved with the reconstruction of the ancient architectural culture carried by ancient buildings. To look at historical and cultural heritage, the elements emphasis on the history and culture is an important extension of the protection of historic buildings. Through the history and culture link, the people's sense of participating in the protection of ancient architecture can be enhanced. The connotation of ancient architectural culture will be analyzed from experience. The importance of the historic building digital cultural experience will be discussed by taking the building's historical and cultural significance into consideration as entry point. The cultural experience of the

ancient architectural digital technology will be analyzed from the perspective of the brain's instinct, behavior, and reflection.

## VI. NEW IDEAS FOR THE SUSTAINABLE DEVELOPMENT OF HISTORIC BUILDINGS IN YANTAI

### A. Concept Innovation

So far, the goal for developing ancient architecture tour in Yantai is relatively simple. Some scenic spots excessively look for ticket proceeds while ignoring the society and environment. Thus the ancient building tour breaks away from the sustainable development ideas. Take Penglai Pavilion as example; in developing the tourism industry, we should attach more importance on unified planning of the city's surrounding environment, i.e. taking Penglai Pavilion as a tourist spot to radiate and drive its surrounding environment quality upgrading while exploring the legend of the Eight Immortals Crossing the Sea to strengthen the cultural spirit connotation construction. By allowing urban residents to participate in the tourism industry and to get benefit from it, the protection of ancient buildings is transferred from the government level into the hearts of every city resident.

### B. Mechanism Construction

A scientific protection plan shall be formulated. Through an in-depth study of the history and present situation of the historic buildings to accurately grasp the context of ancient architecture development and summarize their historical and cultural value, we shall formulate strict protection measures and control requirements as the basis for the management of ancient buildings. As a main manager, the government should change the current intertwined business and management rights. In order to produce economic, cultural and ecological benefits, the government needs to build a platform mechanism for discussions joined by many parties and invite residents living around historic buildings to participate in the decision-making process. At the same time, the government shall specify specific development indicators and assessment indicators, where the past simple economic indicators are separated and the indicators about the culture, environment, ecology and society shall be needed.

## VII. CONCLUSION

Through the exploration of the protection and development theory of ancient buildings, this paper has concluded that the key to the protection and tourism development of ancient buildings in Yantai is sustainable and the sustainable development view is the most suitable theory for developing historic building travel. The breakthrough point of ancient architecture protection technology is setting up a digital information model of ancient buildings and the digital technology and the study of sustainable tourism thought are the key to protect and develop historic buildings. Put the theory in this paper into actual case, such as Ding Family Mansion in Longkou, Mous Manor in Qixia, and Penglai Pavilion and so on. Looking for a point at which Yantai's ancient buildings protection and its

utilization are balanced and a study of dynamic management pattern of ancient buildings, government and other stakeholders (residents, tourists, the public) in all-round way and from multi angles will make the ancient building protection and tourism utilization go to a digital, sustainable development path.

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