




AKADÉMIAI KIADÓ

Regeneration and sustainable development of vernacular architecture

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ABSTRACT

Vernacular architecture is the source of the historical development of architecture and the carrier of traditional culture. It is also the emotional sustenance of contemporary Chinese people's beautiful homesickness. With the rapid expansion of urbanization in China, a widespread phenomenon of "hollow villages" has emerged in rural areas, and there are many abandoned rural buildings all over the countryside. Therefore, the protection and sustainable development of rural architecture are imminent. Based on the author's rural construction project in China, this research integrates environmental psychology and architecture and tries to build a high-quality living environment, aiming to explore a new design strategy to meet the challenges in the future.

KEYWORDS

vernacular architecture, environmental psychology, conversation, empathy, man-land relationship, sustainability

1. INTRODUCTION

Throughout the world, sustainability is an inherent urban and architectural problem. It is simultaneously characterized by many different dimensions (economic, environmental, and social) [1]. With the rapid development of urban-rural integration in China, the sustainability concept is reflected in the construction process of rural revitalization in China at the present stage at the same time. Since the 1990s, China began to implement the process of urbanization, increased number of rural populations migrated to the city in search of better employment prospects [2]. In this context, large-scale idle houses appeared in rural areas, and massive traditional villages lost their vitality and were gradually abandoned or demolished. This phenomenon leads to the unequal development trajectory between traditional villages and modern cities. With the advent of industrialization and the rise of the modern movement, architecture relinquished the past in favor of the future [3]. Traditional vernacular architectural culture has been gradually assimilated in the wave of urbanization, and rural regional culture has been eroded to varying degrees, mainly manifested in the absence of cultural continuity and environmental protection [4]. "On-site protection" and sustainable

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development of traditional villages have become issues that need to find planning approaches able to respond to demands for both sustainability and extensive urban development [5].

In this background, to ensure a sustainable environment for generations to come [6], the more effective protection and use of vernacular building resources, the continuation of the history of the regional cultural context make it adapt to the development of the times, it is imperative to research on the sustainable development of vernacular architecture. In today's era of inheriting historical and traditional culture and combining present new ideas, concepts, and technologies, as well as abstract concept design [7], architects need to establish sustainable thinking through active relationship creation, and coordinate the relationship among protection, utilization, and development. Hope to build a beautiful and ecologically livable village, while maintaining village characteristics and views while simultaneously ensuring the benefit of the ecological system under the principle of sustainability [8].

Liang Wang Bie Yuan is in Shanting District, Zaozhuang City, Shandong Province, China. It is a rural housing reconstruction project supported by the government under the Chinese beautiful village construction policy. With more than 150 years of history, Liang Wang Bie Yuan is a typical traditional residential building in the south of Shandong province. The original building is an independent building of 70 square meters, with a local traditional stone house and an open courtyard (Fig. 1). After the change of nearly half a century, the owner of the house has already moved to the city to live, Liang Wang courtyard, unfortunately, became an abandoned farmyard, lost the vitality of the past. As China attaches great importance to "culture and rural revitalization" in recent years, the local government has begun to carry out the large-scale protective restoration of traditional vernacular architecture. The author's design team was fortunate to participate in the rural revitalization construction in this region, and Liang Wang Bie Yuan is one of the actual projects. In this project, the upgrade of vernacular architecture infrastructure and the creation of site environment are the core contents of the design, and the difficulty is to realize the organic integration of local traditional architectural culture and vernacular architectural environment. Therefore, the design team decided that the restoration of



Fig. 1. The original out-doer's situation of Liang Wang Bie Yuan, Zaozhuang, Shandong, China
(Source: Photo by E. Q. Zhang)

the main structure of the building, the expansion of the building function, and the creation of indoor and outdoor space artistic atmosphere are the main contents of the project implementation.

2. MATERIALS AND METHODS

The conservation method with "reuse design" as the primary means is a unique branch from the field of architectural design, whose most significant idea and connotation are to dialogue with history in appropriate architectural language [9]. As an architect the question is, how to realize the equal dialogue between traditional local culture and contemporary urban culture through the design intervention? How to improve the sense of belonging of residents with the help of emotional space? How to build a positive relationship between vernacular architecture and people? These three aspects are the focus of this study.

2.1. The concept of vernacular architectural heritage

From the perspective of historical development, vernacular architecture is an authentic product of a specific place and is produced by non-expert ordinary people through shared knowledge passed down over time [10]. Vernacular architecture is the material carrier of the vast rural morphology that condenses the traditional regional culture, and at the same time, entrusts the strong native feelings and happy childhood memories of contemporary urbanites. Throughout the development history of the traditional Chinese architectural environment, more obvious historical and regional cultural characteristics are retained in its design concept, showing the self-sufficiency, and closed spatial structure and the harmonious coexistence of man and the environment of "unity of nature and man" [11]. From a broad perspective, according to the expert Lou Qingxi [12], who is a scholar of ancient architecture at Tsinghua University, vernacular architecture must have regional characteristics, and it is the material carrier of regional culture. From a narrow perspective, vernacular architecture is usually built-in rural areas, mainly including traditional villages or some ancient buildings in rural areas [12], and its existence is universal. Vernacular architecture has demonstrated its perfect environmental adaptability through experiential development and improvement by generations of users and builders [13].

2.2. The status quo of Chinese vernacular architectural heritage

First, since the development of China's economy by leaps to the rapid change of urbanization, multiple differences between urban and rural areas has become increasingly clear, traditional farming settlement mode in this context, showing many discomforts, a large number of rural population into the modern city life, rural "hollowing out" phenomenon is serious that lead to a native vernacular architecture is the collective abandoned, the natural form of the village is on

the verge of extinction; Second, because located in remote mountainous areas, The times of economic and cultural development lags, the basis of villagers living facilities are falling behind, they are eager to improve living conditions, so the villager's autonomy transform the phenomenon of the homestead is widespread, violation of embedded the serious security hidden danger. In addition, with the development of the current fifth generation era has brought the new pattern of information globalization, the residents of rural farmers got a large number of latest information through the Internet so that the construction way of the non-local area affected local style. Under the influence, the new vernacular architecture has lost its regional attribute. The characteristic countryside gradually turned into the monochrome one.

2.3. Problems to be solved in the re-use of vernacular architectural heritage

In general, the countryside has become a place of cultural meaning to urban tourists [14]. The reuse of rural architectural heritage is a systematic regeneration process involving the transformation of individual lifestyle, the inheritance of regional culture, the innovation of social system, the sustainable development of the environment, and other issues. In this process, the owners should be encouraged to maintain the house by themselves and emphasize the professional optimization of architectural space from architects, also need to rely on the policy support of the local government. Therefore, designers should approach the connection and interaction between various systems in holistic thinking. Through field research and qualitative analysis, the author believes that the four aspects of livability, diversified development, place spirit, and sustainable reuse of vernacular architecture are the main problems to be solved in the vernacular architecture heritage (Table 1).

2.4. Methodology

In this study, the author uses the method of qualitative research, aiming at the establishment of harmonious man-land relationship and low-carbon construction approach, hoping to construct feasible and communicative strategies for the regeneration of vernacular architecture through multi-dimensional research. The research process extends from architectural design to the multi-dimensional field and tries to construct systematic research methods to cope with the implementation of specific projects that mainly focus on the adaptable reuse of contemporary Chinese rural old buildings.

Table 1. Problems to be solved in the re-use of vernacular architectural heritage

Content	Importance	PCT
Livability	01	25%
Diversified Development	02	20%
Place Spirit	03	30%
Sustainable Reuse	04	25%
Total	04	100%

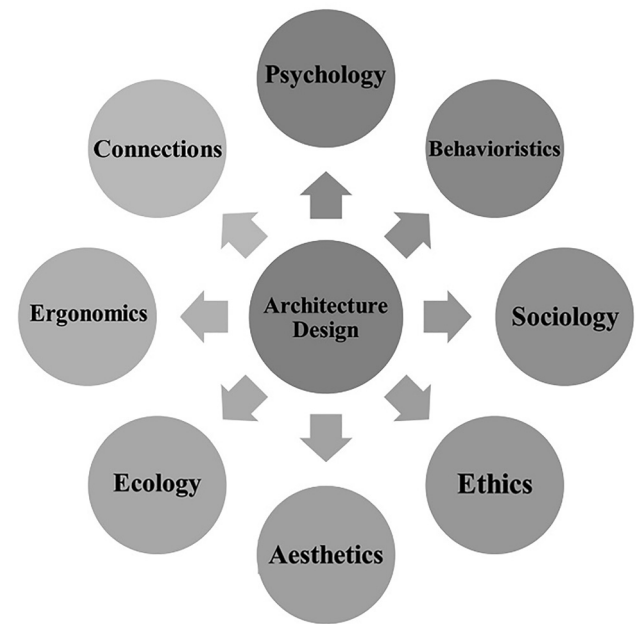


Fig. 2. Schematic diagram of cross-research approaches (Source: Designed by H. Cao)

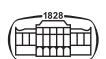
Based on architecture and drawing inspiration from environmental psychology, sociology, behavioral science, aesthetics, and other disciplines, the author tries to conduct cross-boundary research on the reuse of vernacular architecture and is committed to creating an ideal and original living environment model for contemporary Chinese villages (Fig. 2).

First, through the spatial reorganization to recreate the old space environment, create a friendly space atmosphere and high-quality environment to stimulate people's positive environmental experience. Secondly, try to promote the effective interaction between people and the environment by creating a harmonious space atmosphere and a humanized architectural space, and to generate a positive sense of participation and belonging, and stimulating people's awareness of the protection of vernacular architecture. Finally, through the communication between people and the environment, the harmonious relationship between people and the surroundings is re-established, and people's attention to local culture is aroused again to achieve a win-win situation between people and the environment. Uses heritage and traditions to offer experiences [15], vernacular architecture and traditional culture are integrated and build a virtual space bridge by space narrative, between the past, present, and future, freeing people from modern and complicated urban life and returning to nature.

3. RESULTS AND DISCUSSION

3.1. Results

As a part of traditional villages, the sustainable development of vernacular architecture should interpret the existing environmental conditions based on respecting the



authenticity of the local environment, and its rebirth should reflect the concept of advancing with the times while retaining the characteristics of the region and realizing the effective integration of local traditional culture and modern culture. The project design aims to create a harmonious relationship between people and land, and actively expands the value of old buildings through environmental reorganization and atmosphere creation, especially to meet the actual needs of users. Improving the quality of spiritual life on the premise of meeting the material needs of the villagers is the principle of the regeneration of vernacular architecture. Therefore, based on the practical experience of rural architecture design in recent years, the author conducts cross-border research based on architecture and environmental psychology and carries on research and design practice on actual projects around the design concepts of reuse, space empathy, and dialogue. Through the creation of space, create a healthy atmosphere for individuals so that could easily immerse themselves [16].

3.2. Case study

Liang Wang Bie Yuan project is a positive attempt to sustainable reuse of vernacular architecture, and its design inspiration comes from the artistic conception expression of traditional Chinese landscape painting. The architectural design and environment creation of the project are based on the ancient Chinese idea of the unity of man and nature, and the author tries to decode and encode the traditional cultural elements and convert them into the language of architectural design. The implementation of the project emphasizes the atmosphere creation of the architectural environment and the artistic expression of space. The core idea of the design is to rebuild the sustainable relationship between man and local culture, human and natural ecological environment, and between people.

First, in the infrastructure restoration, the author pays attention to multi-dimensional thinking from materiality to construction techniques [17]. Based on the principle of "locality" of vernacular architecture, the author employs local masons and carpenters to repair the damaged internal environment and external structure and adopts traditional building techniques in southern Shandong through a low carbon construction process, and to minimize the energy consumption and environmental pollution. In the construction process, all the original local natural materials are used to make the building warmer and more memorable, reflecting the eco-friendly construction process. For example, local bamboo, bluestone, straw, river sand, traditional gray tiles, and other materials are designed for engineering construction. The preservation and repair of old buildings based on classic construction technology has realized the inheritance of local traditional local culture to the greatest extent and found the possibility for the local cultural tourism industry to feature traditional culture. In addition, the author realizes the equal dialogue between local architectural culture and modern civilization through the implementation of the project (Fig. 3).



Fig. 3. Liang Wang Bie Yuan construction process by traditional house building techniques
(Source: Photographed by H. Cao and E. Q. Zhang)

Secondly, based on the site characteristics and use functions, the design team paid attention to the reorganization and optimization of the space. Expand the old building from 70 to 120 square meters to make it have multi-functional use, expand the use function of the old building to make it more in line with the living habits and needs of contemporary people, such as living room, side house, pavilion, toilet wait. At the same time, the design team used traditional stone masonry structure combined with the bamboo fence to build a semi-enclosed natural courtyard with an area of 420 square meters, used local stones to design a classic Ting trail, and redesigned the traditional courtyard gate to make the outside the environment is more harmonious and fuller of privacy (Fig. 4). To pay homage to nature, the team made full use of the topographical conditions and repaired the natural opening on the west side of the courtyard, creating a natural hydrophilic landscape, making the environment a sense of intimacy and atmosphere. Through the site reconstruction, especially the design of the hydrophilic landscape, and adds new layers to the architectural work, adding space to the water [18], the organic integration of the old buildings and the novel landscape creates an empathetic scene form (Fig. 5).

At last, the project design is inspired by the architectural culture of the Southern and Northern Dynasties of China and renders the atmosphere of the environment through artistic intervention to achieve the experience of empathy between people and the environment. In the construction of indoor and outdoor environments, the author fully considers the physical environment affecting the human body and mind and enhances the experience of the living



Fig. 4. Real scene of Liang Wang Bie Yuan courtyard after space function optimization
(Source: Designed by H. Cao and E. Q. Zhang)



Fig. 5. The construction of natural hydrophilic landscape belt with narrative nature

(Source: Designed by H. Cao and E. Q. Zhang)

environment through the construction of space atmosphere. In the creation of interior space, the author emphasizes the concept of returning to the origin, restores the interior space to the simple living condition of ancient people, reduces the use of modern electrified equipment, and encourages people to gather for face-to-face conversation and interaction through the space organization with Zen atmosphere. Try to establish a positive spatial experience to alleviate people's fear in social interaction. In the design of the external environment atmosphere, the design focus on experiencing nature and being close to truffles natural as the theme, the author emphasizes in the design environment of dialogue between humans and nature. The outdoor courtyard design for dry land landscape and wetland landscape space form of mutual integration, the symbolic expression of the site conveys the traditional Chinese Taiji culture, has created a rich ecological landscape of Zen to let people immerse in enjoying the leisurely life (Fig. 6). It has been shown that interactions with nature can deliver a range of psychological well-being, cognitive, physiological, social, tangible, and spiritual benefits [19]. Through the environment creation approach, the project reflects people's sense of contentment and happiness and the consideration of the human ideal living settlement.

3.3. Discussion

The adaptable reuse of contemporary vernacular architecture is a process of rational thinking and perceptual creation. Its purpose is to re-establish the sustainable relationship between local culture and urban culture, stimulate the vitality of local resources through architectural design, make the development of vernacular architecture more possible,



Fig. 6. Indoor real scene of Liang Wang Bie Yuan after completion
(Source: Photographed by H. Cao and E. Q. Zhang)

and improve the user's experience through a pleasant local architectural environment.

The reconstruction of vernacular architecture is not simply related to the physical space, but much importance is about the positive relationship construction between people and the site. The implementation of this project fully respects the local customs, remodeling the original buildings through low-carbon construction methods and traditional construction techniques, creating a harmonious human-land relationship, and constructing a new paradigm for the sustainable development of vernacular architecture.

In the future, the cross-border integration of the architectural field and other fields will become a new trend, combining multi-field theoretical research and methodology through the architectural approach to create a space that is more in line with contemporary people's use. The architect's role is changing from the creator of physical space to the maker of human relationships, and the functions of buildings will also become more diversified.

4. CONCLUSION

In China, the protection of vernacular architecture is often the technical restoration of the original environment by architects, and most of them stay in the field of architecture, which is not conducive to the sustainable development of vernacular architecture.

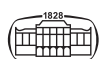
In future research, architects and planners should strengthen the research on the scientific aspects of vernacular building restoration and explore more possibilities of vernacular architecture through interdisciplinary research, especially in the specific implementation stage, which pays attention to the scientific and livability of construction, not just the artistic expression.

Secondly, this research carries out in the context of China's rural revitalization, which bases on government-level policy-led rural construction activities. Although it is uniform, universal, and radiating, a study of the diverse needs of rural subjects is not perfect enough, and it will be studied systematically from a multi-dimensional perspective in future research.

Finally, the focus of the research should be on the main body of the rural architectural environment, actively explore strategies for sustainable development of rural architecture, and have innovative applications to meet the complex needs of modern people. Enhance the well-being of local farmers and achieve an ideal situation of mutual benefit to stimulate the interest of relevant stakeholders. Effective interconnection with the help of vernacular architecture is conducive to the sustainable protection and healthy development of modern villages.

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