Application of Container Building in Community Ecological Environment Renewal——Taking Gejiaying Community in Wuhan as an Example

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Abstract. Community micro renewal should conform to the urban texture and respect the conservation of ecological environment. As an important military industrial area in history, Gejiaying community, located in the ancient city of Wuchang and close to the riverside area, is not only rich in human resources and has a long history and culture, but also its spiritual temperament is in line with the rich industrial heritage groups nearby. Therefore, while reshaping its own historical and cultural characteristics, Gejiaying community should also focus on the continuity and transmission of the city's history and culture. The terminal product, assembling flexible and environment-friendly containers, should be put into the community micro renewal. The machine aesthetics of container building is skillfully used to continue and repair its cultural context in the renewal of the ecological environment of the community, so as to create the ecological and aesthetic symbol belonging to Gejiaying.

1. Introduction

The community is an organism in the city. Its ecological environment transformation should conform to the urban texture, reduce energy consumption, and retain its cultural and historical heritage. At the same time, the ecological values of sustainable development promote the urban renewal to gradually abandon the old district reconstruction mode which used to be demolished and built in a large scale, and change to the urban renewal mode with the multiple objectives of protecting the ecological environment, reducing pollution and highlighting the regional characteristics.

Gejiaying community is close to the riverside area of Wuchang. There are many wharves nearby with rich types and a long history. With the change of history, Wuchang wharf has left rich industrial heritages and unique urban texture. Based on the above thinking, we want to apply the container environmental protection building, which represents the port culture and machine aesthetics, to the community ecological environment reconstruction. Through the partial use of detachable and flexible container buildings, we can reduce environmental pollution, improve the function of community buildings, shape the regional characteristics, protect and reuse the existing buildings, retain the city memory, and optimize the ecological environment.
2. Analysis of environmental status of Gejiaying community

2.1 Environmental profile

Gejiaying community is located at the foot of Wuchang garden, covering an area of 0.15 square kilometers. The community has a long history and simple folk customs. It was named Gejiaying because Chongyang Jingjian, the grandson of Ming Dynasty Emperor Zhu Yuanzhang, built the palace and back garden here. Later, in the Qing Dynasty, it had a large number of weapons and armour, so it was named Gejiaying.

2.2 Multi culture

Gejiaying community used to be an important place of military industry, a gathering of talents and a long history and culture. Its revolutionary culture, religious culture, imperial examination culture, market culture and the creative culture accelerated to settle in the community in recent years constitute a pluralistic Gejiaying culture. Based on the reuse of containers and the commemoration of the distinctive weapon culture of Gejiaying, this community micro update will focus on the feasibility of the integration of creative culture and container architecture.

2.3 Current Situation

Gejiaying community has excellent geographical environment, long history and many precious historical relics. These buildings have experienced a hundred years of vicissitudes, bearing many stories about this community and even Wuhan city. They are precious buildings that can not be copied. However, due to the fact that many buildings were built spontaneously by the original residents in the 1980s-1990s, the quality is uneven, and the overall architectural style is mixed and not unified. The roof forms include flat roof and sloping roof, with various colors. The overall architectural style and color are quite different.

At present, the development of community is facing various problems: due to the single industry, low income level of residents, a large number of young people go out to work, and the community population is gradually aging; the rapid expansion of the city, coupled with the relatively low rent in the community, a large number of foreign population influx, destroying the original living atmosphere of the community; inadequate public facilities, poor living environment, difficult to meet the needs of modern life Living demand; the income level of community residents is generally low, which has gradually evolved into a gathering place of vulnerable groups and a late developing place in urban development[1].

3. Exploration of community ecological environment transformation

3.1 Transformation criteria

3.1.1 Building renovation. In order to improve the living conditions of the community residents, the old buildings built earlier should be integrated with the container to carry out comprehensive and modern transformation; for the buildings preserving historical culture, the relationship between the buildings and the surrounding environment should be coordinated while retaining the architectural style of the residential area.

3.1.2 Public space construction. To meet the needs of residents in different types of public activities, the container full of machine aesthetics is placed to build multi-level and multi-type urban public space. It includes public green space, square, sports space and business district.

3.1.3 Traffic improvement. Open the closed road and form a three-dimensional and multi-level traffic space through the superposition of containers to improve the connectivity and penetration between communities and establish a convenient pedestrian network system. According to the pedestrian network, barrier free access is designed to fully guarantee the travel of vulnerable groups in Gejiaying and provide them with a convenient and safe travel environment[2].

3.1.4 Industry guidance. Cultivate community space that is conducive to innovation and stimulate the entrepreneurial potential of the community; make use of the existing landscape sketches, historical buildings and other resources, such as old factory buildings, riverside areas and empty old buildings,
with containers full of machine aesthetics, to create a cultural and creative employment space integrated with the surrounding communities.

3.2 Key points of community environmental planning

3.2.1 Restore social memory. For the Gejiaying community, at present, most of the people don't think that the Gejiaying community has special historical and cultural value, except that some of the aborigines retain part of their historical memory. Therefore, in order to truly restore the social memory of local residents and maintain the continuity and transmission of history and culture, it is necessary to spread culture and mobilize residents to restore social memory through specific rituals.

3.2.2 Transformation of physical space. Under the condition that the spatial pattern and structure of the building remain unchanged, the transformation and planning of the spatial function, infrastructure, environment, appearance characteristics and internal spatial pattern of the old buildings are combined with the container. First of all, the disordered space inconsistent with the overall image of the building is demolished to restore the form of the building itself. Secondly, the courtyard, Qiangtoubao, main hall and other buildings with high ornamental value were repaired. On this basis, some public spaces combined with container design are added, such as public bathhouse, community reading room, fitness room, chess and card room, and leisure seats are set up in the spare outdoor space or on the lines with good landscape to meet the daily public activity needs of residents.

3.2.3 Reconstruction of spiritual space. We should reshape the historical and cultural characteristics of Gejiaying, continue and repair its cultural context, and create its unique symbol. If the traditional culture between old Wuchang and Gejiaying can be organically integrated, the story of the old city can be told to more people, people's memory can be awakened, and the history and culture with local characteristics of Wuhan can be publicized, Gejiaying will be full of new vitality and vitality[3].

3.2.4 The rebirth of social structure. The renewal and planning of Gejiaying should focus on the retention of aborigines, transform it into a community dominated by aborigines, and create a "living" exhibition showing the life of the old Wuhan people. Only by retaining the "root" of Gejiaying, can we reflect the block life closer to the original ecology.

3.2.5 Improve the multiple functions of the community. Making full use of the characteristics of large pedestrian flow and high market potential in the periphery, the shops in the periphery will be changed into one-stop old Wuhan Cultural Experience Hall combined with Wuhan traditional skills exhibition, purchase and experience. Through the original ecological life, Gejiaying architectural culture exhibition, commercial culture exhibition and traditional handicraft experience, the "quiet in the noisy" and "convenient and quick" are organically combined, It makes Gejiaying a business card of old Wuchang culture.

4. The application of container building in community micro renewal

4.1 Outstanding Advantages of Container Building

Gejiaying has many precious historical buildings and multi-cultural values. The attempt of community renewal in Gejiaying must be cautious and conform to the community's own temperament. As a product of the industrial age, we believe that the machine aesthetics of container itself can arouse the residents' emotion and memory of the past history to a certain extent. Container building units are easy to transport, can be moved as a whole, assembly and disassembly is convenient, construction period is short, construction noise and dust pollution is small, and almost no damage to the site, the living structure of community residents and the historical traces of the community will not be changed because of the entry of containers. Based on the overall box type steel structure, container buildings can derive rich multi-dimensional space by means of push-pull transformation, splicing and combination, such as residential space, office space, leisure and entertainment space, movable space and even large-span exhibition space, etc., which brings rich space levels and trial and error opportunities to the historical blocks with narrow land use and weak economic capacity.
4.2 Application of Container Building

Based on its simple cube form, container building is derived from combination change, emphasizing the elements of straight line, space, proportion, volume, etc., which perfectly conforms to the visual expression and practical function of machine aesthetics[4], and becomes a "living machine" with perfect function to meet the practical requirements of micro renewal in Gejiaying community.

4.2.1 Micro placement of small single box in outdoor activity area. As a small-scale landscape planting or mobile multi-purpose public activity space, temporary scaffold pavilion with demolition capacity, small corner, small workshop, and activity space with small scale, flexibility and transience will bring infinite possibilities to the life of community residents.

Service community - first of all, activities and functions are oriented to the community and nearby tourists and pedestrians. Square, green, trade, catering services for community residents, improve the messy environment of the community.

4.2.2 The combination box can be transformed in the residential area. For the valuable ancient buildings, we should spare no effort to preserve and repair them, so that they can become the place where residents can recall the community culture and tourists can understand the history of Gejiaying. There are various combinations of container houses (Figure1,2,3). For the long-term vacant and dilapidated houses, the newly built simple buildings and the structures built without permission, the targeted transformation can be carried out by taking advantage of the advantages of container mode[5].

![Figure 1. Container house combination mode 1](image1.png)
![Figure 2. Container house combination mode 2](image2.png)
![Figure 3. Container house combination mode 3](image3.png)

4.2.3. Innovative transformation of combined box in business district and cultural area. Cultural community, living community -- let the community excavate its own culture and form cultural guidance. It is the living experience place carrying Wuhan history (Gejiaying is the origin of Wuhan development and the Museum of old Wuhan life), and the container Street museum with Chinese flavor. It shows the Han culture and life culture, and becomes an open and inclusive historical and cultural community, with attractive street culture, Chinese culture, and fine art exchange culture.

Infinitely scalable multi story prefabricated building system (Figure4), The new module can be flexibly combined and extended according to the actual needs of future business users and the needs of cultural activities in the community. A single module, like a cell, has a single function. However, when multiple modules are combined and can grow in three dimensions, the building can become an organic living body to flexibly adapt to the needs of different places and functions.

![Figure 4. Multi layer prefabricated house system with infinite expansion](image4.png)
The historical community is a blend of the old and the new, full of life sentiment. Using the emerging painting culture and carving culture to create cultural creative employment space, the introduction of new functions and the self-renewal of buildings make it not only meet the living needs of contemporary people, but also strengthen the historical block culture of the community.

5. Conclusion

Gejiaying is one of the few historical and cultural blocks in Wuhan, which reflects the most plain living form, rich in life flavor, reflecting the folk customs; at the same time, it is also a flowing and vigorous cultural landscape[6].

Based on the historical context and development characteristics of Gejiaying, the renovation starts from the local and surrounding characteristics, and boldly puts the "machine aesthetics" into the container according to local conditions. It is hoped that while retaining the memory function of traditional culture in historical blocks, we should seek a lifestyle with infinite possibilities in inheritance. This lifestyle is economical, practical, flexible, rational and efficient, which coincides with the development of the times.

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