

Improving the Quality of Public Space in Old Residential Areas Based on Superposition and Intervention: A Case Study of Baihuazhou District of Nanchang City

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Abstract With the development of cities, China has entered an era of stock planning. The functions of old residential areas in urban development can no longer meet the needs of residents in the new era for a better life, and new standards have been put forward for the quality of public spaces for living. This paper analyzes and sorts out the characteristics and problems of the public space in the old residential areas of Baihuazhou district. Combining superposition and intervention techniques, the spatial, historical, cultural and other characteristic elements of the residential areas are preserved to the greatest extent. The public space in the old residential areas of Baihuazhou District is updated and reconstructed in order to achieve the goal of improving the quality of its public space.

Keywords Superposition and intervention, Old residential area, Public space, Quality improvement, Baihuazhou District

DOI 10.16785/j.jissn 1943-989x.2024.4.003

China's urban development is in a stage of shifting from extensive and outward incremental development to refined and connotative stock improvement development. In 2011, China's urbanization rate exceeded 50% for the first time. With the continuous improvement of urbanization rate, the past urban renewal model driven by the market and characterized by creating value-added benefits can no longer solve many urban problems faced by China. In this context, ensuring people's livelihoods, improving the living environment, and emphasizing social governance have become important goals of urban renewal actions^[1]. Since 2012, China has entered a stage of high-quality development. Currently, the development of urbanization in China has entered a strategic stage dominated by urban renewal, shifting from the past pursuit of "whether there is" to the pursuit of "whether it is good or not". In the context of urban renewal, it is necessary to carry out reasonable renovation work on old residential areas^[2]. In the stage of stock development, attention is paid to improving the environmental quality of existing residential buildings, and the expansion speed of cities begins to slow down. More emphasis is placed on the functional transformation and spatial quality improvement of existing urban areas.

This paper explores how to improve the public space quality of old residential areas in the Baihuazhou District through superposition and intervention. While preserving the texture, cultural elements, and spatial pattern of original architecture, modern design is introduced, enhancing residents' sense of happiness, and

promoting the process of urban renewal.

1 Related concepts and theoretical research

1.1 Research object

In cities, public spaces undertake most of the activities in people's daily lives, especially in residential areas. This paper studies the public spaces of old residential areas in Baihuazhou District. By analyzing their current situation, problems, and influencing factors, superposition and intervention are proposed to solve these problems.

1.2 Related concepts

The *Guiding Opinions of the General Office of the State Council on Comprehensively Promoting the Renovation of Old Urban Residential Areas* clearly defines the scope of objects for the current renovation project of old residential areas as urban or county-level old residential areas built before the end of 2000.

Public space refers to the outdoor activity space in old residential areas. Macroscopically, all activity spaces outside the scope of private residences, as well as buildings, structures, etc. within these activity spaces, are considered public space. On a micro level, it refers to functional spaces within the macro level that enable residents to engage in leisure and social activities, such as squares, roads, green spaces, parking lots, sports fields, etc.^[3].

2 Current situation of public spaces in old residential areas

2.1 Current characteristics

(1) There are many elderly people and

tenants, with complex personnel and difficult management. Due to issues such as insufficient business formats and inadequate infrastructure, young people have moved out of old residential areas, where rent is cheaper in the city. Old residential areas have become a place of residence for most migrant workers in the city, and the composition of residents is relatively complex.

(2) The overall decline of old residential areas is beginning. The old residential area has a good location and high land value, but the property configuration remains in the old generation. Due to the lack of clear property management, aging infrastructure, insufficient business formats, and a lack of vitality in old residential areas, the overall trend is declining.

(3) Social security management is difficult, and safety is not guaranteed. Due to the complex composition of residents in old urban communities and the lack of property management, the overall safety of the community is not guaranteed.

2.2 Existing issues

2.2.1 Aging infrastructure. Old residential areas face the problem of aging and functionality loss of water, electricity, heating, and network equipment, which may occupy public space during maintenance or reconstruction. At the same time, transportation planning is outdated, lanes are narrow, parking spaces are insufficient, and there is a lack of a complete transportation network system.

2.2.2 Poor property management. The lack of a systematic property management model in old residential areas has led to the blurring of public

spaces and a large number of private and illegal constructions occupying public spaces within the community.

2.3 Main influencing factors of public space quality in old residential areas

2.3.1 Building facade. As the exterior surface of a building, the building facade serves as the boundary between the internal private space and the external public space, and is also the external interface of the external public space. The building facade is closely related to the daily lives of residents, and most intuitively reflects their perception of the building quality. Through building materials, colors, shapes, etc., it indirectly reflects the overall image of the residential area and public space.

2.3.2 Spatial scale. In the internal environment of residential areas, public space is an objective material environment that can be expressed through length, width, and height. In the *Aesthetic Townscape*, Luyuan Yixin used space theory to analyze the street scale, and believed that $D/H=1-2$ is a reasonable spatial scale^[4]. Only with an appropriate spatial scale can residents feel comfortable and willing to stay in public spaces.

2.3.3 Spatial accessibility. Spatial accessibility mainly measures the degree of superiority or inferiority of a certain element entity's position in space^[5]. In old residential areas, in order to enhance the vitality of public spaces, the first step is to improve the spatial accessibility of the entire residential area, optimize its transportation network, reduce the barrier of road space, and improve the interaction between spaces.

2.3.4 Infrastructure. In the *Life between Buildings*, Jan Gehl stated that the function of public activity spaces should constantly adapt and change according to the needs of residents^[6]. The ability of infrastructure to meet the needs of contemporary residents largely determines whether public spaces in residential areas can attract residents to interact, thereby enhancing spatial vitality.

2.4 Countermeasures for the governance of public spaces in old residential areas

2.4.1 Connecting scattered idle land in old residential areas. The existing public spaces in old residential areas are generally scattered and fragmented, and these scattered land uses can be connected according to the actual situation to form a systematic public space system.

2.4.2 Hiding land for functions such as water, electricity, gas, heating, and network, etc. To avoid the occupation of public space by water, electricity, gas, heating, and network, this part

of the facilities and land are hidden. It not only improves the functional guarantee of infrastructure, but also creates more surface public spaces and enhances the suitability of public spaces.

2.4.3 Demolishing illegal structures to expand outdoor space. Due to insufficient space, many residents in old residential areas illegally build structures on the basis of existing buildings in the street space, in order to obtain more private space. So it is a necessary way to expand the public space of old residential areas by demolishing illegal structures.

2.4.4 Constructing green land and art sketches. The lack of greenery in the public spaces of old residential areas leads to low quality and lack of vitality. Therefore, greening and landscape design are important components of improving the quality of public spaces, and are necessary projects for building the image of residential areas and meeting the aesthetic needs of residents.

3 Improvement of public space quality in Baihuazhou District

3.1 Principles for the renewal of public spaces in Baihuazhou District

3.1.1 Small scale and multi-stage. Due to the current general trend of stock planning, in order to avoid the phenomenon of construction and dismantling in the process of renewal, it draws lessons from foreign "urban acupuncture and moxibustion therapy"^[7]. It advocates to find out the existing problems of the old residential areas in Baihuazhou District in the same way as acupuncture and moxibustion with "micro renewal", and carry out small-scale renovation of key points to achieve the goal of improving the quality of the entire public space.

3.1.2 Respecting the needs of residents. The design of public spaces in residential areas is essentially aimed at providing better services to residents. "Putting people first" is one of the important principles for the renewal of old residential areas, and the fundamental purpose of renewal is to provide residents with a better living environment^[8]. In the process of improving the quality of public space in the old residential areas of Baihuazhou District, it should be recognized that public space should not be a single functional activity space, but should pay attention to the diversity of suitable populations and meet the needs of multiple age groups.

3.1.3 Reflecting the characteristics of the area. It is very important to preserve the original characteristics of the area during urban renewal, which is an important way to preserve the

memory of the old city for residents and also reflects the historical, cultural, regional and other characteristic elements of Baihuazhou District. It should deeply explore the characteristics of existing residential areas, combine natural and cultural environments to improve the quality of public spaces, and activate the vitality of old residential areas.

3.1.4 Improving the living environment. Currently, there are various problems in old residential areas, such as dirty and messy spaces in front of houses, disorderly parking and occupation of street space by non motorized vehicles, and illegal and disorderly construction of residential houses, which seriously affect the quality of public space environment in residential areas. Solutions are provided to the current situation of public spaces in old residential areas of Baihuazhou District. The unused or abandoned fragmented spaces should be utilized. Through construction, repair, and functional replacement, public spaces could be enriched, their vitality could be enhanced, and the life quality of residents could be improved.

3.2 Current situation of public space in Baihuazhou District

The scope of this study on the public space of old residential areas is selected from Baihuazhou District, which starts from Dieshan Road in the north, borders Ruzi Road in the south, connects to Xiangshan North Road in the west, and faces Supu Road in the east, with a total land area of approximately 106.1 hm² (Fig.1). The Baihuazhou District is located in the central area of the old city of Nanchang, with Baihuazhou as the core, forming a three-lake and one-line surrounding lake area with East Lake, South Lake, and North Lake.

From Fig.2-5, it can be seen that the architectural style of the East Lake, West Lake, and Youmin Temple areas in Baihuazhou District is not good, and the buildings inside need to be repaired and renovated. The architectural style of other areas is relatively uniform and good.

From Fig.6-9, it can be seen that due to the lack of public parking spaces, private cars park on the roadside in the residential area of Baihuazhou District, and the street space is occupied. The barrier between spaces is strengthened, and the connectivity is weakened. The willingness of residents to reach various spaces is reduced, and the vitality of the area is decreased. Due to the disorderly construction of private residences, street and alley spaces have been encroached upon, resulting in insufficient space and fire safety issues.

The open spaces in Baihuazhou District are

mainly concentrated in Bayi Park, Ruziting Park, and the surrounding squares and green spaces of Youmin Temple. Other public spaces are mostly fragmented and separated by buildings or roads. Fig.7, Fig.8, Fig.10, and Fig.11 show that the large open spaces in the area are relatively concentrated. Rest facilities are mainly distributed in Bayi Park, and there is a lack of daily rest facilities in residential areas. The quality of public space in the residential area of Baihuazhou District is not high and needs to be improved.

3.3 Main problems of public space in Baihuazhou District

3.3.1 Street space. The gap between buildings in the residential area is too small, presenting a phenomenon of "handshake buildings". The streets and alleys are narrow, and the old residential areas lack parking spaces. The street space is occupied by daily necessities and lacks local cultural memory points.

3.3.2 Square. The inadequate service facilities in the square result in low interaction between people and space. As representative public spaces within old residential areas, these spaces should carry the daily repetitive lives of surrounding residents, but their leisure and entertainment facilities are not sufficiently complete in terms of quantity and form.

3.3.3 Outdoor venues in residential areas. The outdoor living environment of residents in old residential areas is urgent to be improved, and there are lack of green and communication spaces between buildings and roads. There are lack of green landscapes and cultural elements in outdoor areas, and greenery in the area is relatively little. The distribution of green spaces is uneven, and the main form of greenery is

roadside greening, lacking accessible green spaces.

3.3.4 Park. The entire park includes various leisure facilities and sports venues. However, the needs of different age groups vary, and the facilities in the park are suitable for the elderly, with a single form of facility.

3.4 Design method for improving the quality of public space in Baihuazhou District

Superposition and intervention in the original are two main paths for the reconstruction of ancient city space, mainly aimed at using this method in the protection and restoration of ancient cities to preserve the spatial texture, cultural characteristics, and ancient architectural elements, and achieving the purpose of continuity of cultural context and inheritance of historical culture. Stacking refers to the process of overlapping, while trace refers to the transactions that have existed and the traces left behind. The stacked trace style aims to use history as the coordinate of development, and continue and inherit layer by layer, thus reflecting the "presence" of history^[9]. In the process of improving the quality of public spaces in Baihuazhou District, superposition is used to continue and reconstruct the texture, pattern, and function of public spaces. The original meaning of intervention refers to "intervening in a transaction or event", describing the mutual relationship between the interventional and the intervened transactions, and intervention is a guiding behavior^[9]. In the improvement of public space quality in Baihuazhou District, intervention is used to integrate new spatial forms, functional formats, etc. into existing

spaces, and add new contemporary elements to the development of public spaces, to reconstruct their spatial forms, stimulate the vitality of public spaces, and enhance the quality of public spaces.

3.5 Strategies for improving the quality of public space in Baihuazhou District

3.5.1 Stacked trace style of renovation path.

(1) Reshaping the spatial pattern. For the street space and outdoor green space in Baihuazhou District, the main features should be preserved. Modern spatial elements should be overlaid, and the relationship among "boundaries, axes, centers, and place signs" should be respected^[9]. By optimizing and integrating the public space structure in Baihuazhou District, fragmented public spaces are connected into a whole through linear relationships. At the same time, cultural elements in Baihuazhou District are added to make the public space more locally distinctive, enhance the residents' sense of residential identity and belonging, and improve the vitality of the area and the quality of the public space environment.

(2) Repairing the style and texture. Combining the cultural elements of Baihuazhou District and the original spatial texture of the residential area, the renovation and construction will be controlled within the plot units to avoid the design and construction encroaching on the street and alley texture during the renovation process. Based on the symbolic characteristics of different cultural elements, the internal space of the residential area is reconstructed to improve the quality of public space both inside and outside the residential area.

(3) Creating venue signage. Signs are clues that determine spatial location and urban image,



Fig.1 Research area of Baihuazhou District



Fig.2 North Lake and South Lake areas



Fig.4 East Lake area



Fig.3 Youmin Temple area



Fig.5 West Lake area

and interact with surrounding elements in public spaces. In Baihuazhou District, Bayi Park can be chosen as the main landmark space. An imaginative spatial system within the old residential area can be constructed, and the recreational facilities within the park can be improved to cater to more young people and residents of different age groups.

(4) Continuing the land use function. Many old buildings on public functional land in Baihuazhou District are gradually disappearing. As cultural venues for public spaces in old residential areas, the buildings above them are being replaced, but their functions will be continued to a certain extent^[10]. The original public buildings in the old residential area of Baihuazhou District can continue their original functions and vitality through functional superposition, improving the living environment of the old residential area.

3.5.2 Interventional transformation path.

(1) Intervention by layer. The old community in Baihuazhou District is itself an independent system, which can be divided into social life system, infrastructure system, etc. according to its functions. Especially in the living system, public space runs through the social life of residents in the entire old community. Through the framework of different levels such as districts, streets, and residents, appropriate types and scales of elements are introduced based on

their connection with the external environment and their internal connection needs, achieving the goal of public space reconstruction and improving quality.

(2) Intervention by scale. Within the old community of Baihuazhou, residential areas can be classified into different scales such as overall, block, street, and location based on residents' psychological cognition. Based on the characteristics of public spaces at different scales, new elements of space, history, and cultural forms are added to intervene in the transformation of public spaces in a targeted manner, achieving the organic combination of new content and old spaces, and enhancing the vitality of public spaces in old residential areas.

(3) Intervention by type. The types of intervention for the renewal and renovation of old residential areas in Baihuazhou can be divided into spatial forms and product formats. The governance of public spaces mainly involves intervening in new spatial forms. Based on the residents' demand for improving the quality of the living environment, the existing foundation and future development, targeted intervention, improvement, and governance should be carried out according to the current characteristics of different types of public spaces. In accordance with the authenticity of old residential areas and coordination of old and new residential areas, modern materials and craftsmanship should

be combined with the original characteristic elements to intervene in the public spaces of residents' daily lives in a differentiated manner.

4 Conclusions

By analyzing the main characteristics and problems of public spaces in old residential areas, the factors that affect the quality of public spaces are analyzed. Combining existing common problems, appropriate updating methods are summarized, and the principles of updating and transforming public spaces in old residential areas of Baihuazhou District are clarified. Historical elements are extracted from the material space and cultural aspect of the district, and public spaces in old residential areas are reconstructed through superposition and intervention methods, to achieve the goal of improving the quality of public spaces in Baihuazhou District.

The Baihuazhou District is a trace of urban transformation in Nanchang, and also a life memory of local residents. It should respect the historical imprints and create them based on contemporary times. It should leave traces of contemporary creation, and ancient and modern form a new space^[11]. From the perspective of urban development, cities are a long-term development process, so improving the quality of public spaces in old residential areas is a long-term and complex task.



Fig.6 Streets of Baihuazhou District



Fig.7 Square in front of Youmin Temple



Fig.8 Slow walking path of Bayi Park



Fig.9 Residential alleys of Baihuazhou District



Fig.10 Green space adjacent to Youmin Temple



Fig.11 Inside Bayi Park

(To be continued in P20)

segmented construction. In order to determine the optimal planting time for seedlings, it is essential to consider their growth habits. When deploying seedlings, it is crucial to select a suitable transport route and mode to ensure timely delivery and prevent delays in planting. This will also help to avoid the potential issue of laborers being unable to work effectively due to a lack of seedlings. The planting process should be conducted in accordance with the established guidelines for tree hole preparation, fertilizer application, support structure installation, and root irrigation. Additionally, nutrition is supplemented according to the specific growth of seedlings, to increase the survival rate of seedlings. After the completion of the project, the project manager should be familiar with the acceptance standards, and apply for acceptance in time after passing the self-inspection. The sooner the acceptance is passed, the sooner the warranty period is entered, thus reducing the maintenance cost.

4.4 Maintenance cost control

Highway greening landscape maintenance requires long-term investment costs. In order to improve the maintenance management input and output benefits^[14], it is necessary to choose professional maintenance personnel to develop maintenance work schedule for regular watering, pruning, fertilizer application, timely management of diseases and pests to ensure the survival rate of green plants and reduce the cost of later reconfiguration of plants. It is necessary to implement the material receiving system, material categorization and placement, and do a good job of maintenance material receiving and using records, thus avoiding material waste^[15]. Therefore, the cost control of the maintenance phase should be controlled from three aspects: the quality of maintenance personnel, technical

costs, and material costs.

5 Conclusions

The cost control of highway greening project is a comprehensive and dynamic process which involves every link of the project. Cost is regarded as a prerequisite from the early design to the later maintenance, and cost can determine the choice of design scheme and construction method. Therefore, a scientific and perfect cost management control system should be established from the beginning of the project. While guaranteeing the greening landscape effect and the duration of the project, it is essential to regulate the crucial nodes in each phase of the design, construction, and maintenance process. Furthermore, it is vital to facilitate close collaboration between all parties involved, thereby reducing costs, conserving resources, and lowering energy consumption. This approach can also lead to enhanced economic and social benefits for highway greening projects.

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