

Exploration of the Renovation of Old Residential Districts in Historic Urban Areas of Guangzhou under the Concept of Complete Community

SUN Yijing¹, XIAO Dawei², HUANG Lu³

Author Affiliations 1 Assistant Planner, Guangzhou Urban Planning & Design Survey Research Institute; 2 Professor, School of Architecture, South China University of Technology, State Key Laboratory of Subtropical Building and Urban Science; 3 Editorial Department of *South Architecture*, South China University of Technology, Editor, Corresponding Author, Email: luhuang@scut.edu.cn

ABSTRACT: Currently, the renovation of old residential districts is a pivotal initiative in China to improve the quality of people's lives and stimulate economic growth. Based on Wu Liangyong's concept of Complete Community, this study explored methods to reconstruct old residential districts in historic urban areas of Guangzhou into "complete communities" in order to meet the increasing demands of residents and the requirements of refined community management. This study aimed to provide a new model for the renovation of old residential districts that can be easily promoted and applied in other areas. Firstly, two renovation principles for old residential districts in historic urban areas were proposed: 1) to formulate renovation schemes according to local practical situations by respecting differences among different types of old residential districts; 2) to preserve and inherit residential cultural characteristics of local regions with respect to historical relics and the cultural network of old residential districts. Additionally, corresponding renovation strategies concerning the facilities, spaces, and governance of old residential districts were proposed. With respect to facility renovation, key attention was paid to the marketization of public services, and it was suggested that community social enterprises be built to supplement the public services of old residential districts. It was recommended that community culture be highlighted and community images be built by guiding upgrades of cultural and business facilities. Secondly, attention was paid to the protection of cultural context and texture in public space renovation, with vitality added to public spaces in communities using catalytic elements. Thirdly, regarding the governance of old residential districts, it was proposed to encourage different subjects to participate in community renovation, increase channels for residents to access information about its progress and ways to participate, and promote public participation throughout the renovation period. It was also suggested that social groups be formed to act as a third party, independent from community stakeholders, to balance the interests of multiple parties and guarantee the implementation of the renovation process. Attention should be paid to cultural development in the community, thereby fostering residents' sense of community belonging. Fourthly, the renovation modes of old residential districts were analyzed according to the positions of different subjects in the renovation process, such as the government, enterprises, residents, different aspects of society, etc. To ensure the effective implementation of the renovation schemes, old residential districts in historic urban areas should adopt a renovation mode involving the collaborative participation of multiple subjects. Finally, an evaluation index system for the renovation of old residential districts was established, which included two construction dimensions: Material space (hardware) and community governance & service (software), five level-2 factors, and 16 level-3 factors. A case study based on communities in the Old Nanhai County Community in Liurong Subdistrict was carried out to analyze renovation conditions, and some optimization suggestions were proposed. The research results provide some points of reference for the renovation of old residential districts in historic urban areas.

KEY WORDS: old residential district; complete community; historic urban area; renovation strategy; renovation mode

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Introduction

Since the reform and opening up, China has experienced a rapid urbanization process. In particular, in the mid-to-late 1980s, with the rapid development of the real estate industry, almost all old residential districts in large and medium-sized cities began to enter the stage of renovation and upgrading [1]. According to statistics, there are nearly 160,000 old residential districts nationwide, involving more than 42 million households and a building area of about 4 billion m² [2]. The CPC Central Committee and the State Council have successively issued a series of important documents on the renovation of old urban communities. In December 2019, the Central Economic Work Conference deployed the pilot work of the renovation of old residential districts nationwide [3]. On July 10, 2020, the *Guiding Opinions on Comprehensively Promoting the Renovation of Old Urban Communities* clarified the overall requirements, basic principles, and tasks for the renovation of old districts, established an implementation mechanism, improved supporting policies, and strengthened organizational guarantees [4]. It also proposed to promote the construction of complete residential communities and issued the *Standards for the Construction of Complete Residential Communities (Trial)* and the *Guidelines for the Construction of Complete Residential Communities* in August of the same year [5]. In March 2021, the *Outline of the 14th Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035 of the People's Republic of China* put forward the important task of accelerating urban renewal, which aims to transform and upgrade the functions of existing built-up stock areas such as old residential districts, old factory areas, old blocks and urban villages [6].

As a city with a thousand-year history and culture, Guangzhou took the lead nationwide in carrying out the transformation and redevelopment of existing land due to the influence of building lifespan and land economic lifespan. From the “Three Olds” renovation in 2009 to the “Urban Renewal” campaign in 2015 and the micro-renovation of old residential districts in 2016, Guangzhou completed the renovation of 799 old residential districts by the

end of 2022, with a total renovation area of 45.24 million square meters, involving 620,000 households and 1.986 million people [7]. The renovation of old residential districts in Guangzhou mainly focuses on improving facilities and enhancing the living environment, but has not yet established systematic requirements for community culture and governance. Therefore, the key challenge lies in transforming these communities into Complete Communities integrating both hardware and software dimensions¹⁾. Exploring a paradigm for the construction of complete residential communities is a topic worth discussing in Guangzhou, a pioneer in the micro-renovation of old residential communities nationwide.

1 Principles for the renovation of old residential districts in historic urban areas

1.1 Respect differences and adapt to local conditions

The problems of old residential districts in historic urban areas are diverse. As participants, promoters, and beneficiaries of the renovation, the residents also have different needs. Therefore, the design and construction standards for the renovation of old residential districts should not be uniformly applied. Before renovation, a detailed survey of residents' needs should be conducted in the community to understand the community culture and respect the differences between different types of old residential districts, and thus propose tailored renovation plans.

1.2 Respect history and preserve authenticity

In the renovation of old residential districts in historic urban areas, it is necessary to respect history, maintain the original residential functions, protect the social network gradually established by residents in long-term community life, inherit and develop the regional characteristics of residential culture, so as to preserve the authenticity of local life, revitalize community vitality, and make the community an organic unit of the city [8].

2 Strategies for the renovation of old residential districts in historic urban areas

2.1 Facility upgrade strategy-introducing the market and activating latent spatial potential

In modern society, the marketization of public serv-

ices has become a development trend of government social service supply in China and internationally[9]. The historic urban areas have relatively complete public service facilities, which is an achievement of Guangzhou's efforts to address the shortcomings in public service facilities. It also relies on the economic foundation of the old city as the original urban center. Therefore, the development direction of public service facilities in such communities should be more targeted. Taking commercial service facilities as an example, in historic urban areas, many old residential districts with street and alley layouts are located in historic and cultural blocks, and their surrounding cultural and commercial resources are rich. Therefore, in the renovation of old residential districts, the upgrading of cultural and commercial service facilities should be strategically guided. On the premise of ensuring the authenticity of community life, introducing boutique businesses that are in line with the community culture will help shape the community image and improve the quality of community commercial service facilities. Taking elderly care services

as an example, the large elderly population in historic urban areas makes providing public services for home-based elderly care an issue that cannot be ignored in the renovation of old residential districts. Therefore, allowing and encouraging community-based elderly care service facilities to explore marketization on the basis of meeting the needs of universal services can alleviate the pressure of government subsidies to a certain extent and is conducive to the sustainable development of elderly-friendly public services. The marketization and professionalization of community-based elderly care services can bring about professional services, which in turn lead to service and consumption upgrades, enabling communities to better provide elderly care services to cities and create additional employment opportunities. The government, communities, and third-party market companies working together, with the government acting as a safety net, third-party companies providing services, and communities conducting oversight, ensure the marketization of public services in old residential districts and promote a virtuous cycle (Table 1).

Table 1 Comparison of third-party community service provision by non-governmental organizations

	Nonprofit social organizations [10]	Social enterprises [11]	Commercial enterprises
Nature	Purely for public welfare	Combining public welfare and commercial interests	For commercial interests
Target	Create social value	Create social and economic value	Economic value
Purpose	Driven by social responsibility	Market operations that prioritize achieving social benefits	Market-driven
Profit allocation/ surplus revenue usage	Used for public welfare	Reinvesting in economic activities aimed at social benefits and giving back to the community	For the benefit of shareholders and business owners

2.2 Strategies for spatial renovation-cultural continuity and functional enhancement

2.2.1 Preserve the spatial texture and provide a comfortable space for interaction

Given the limited existing space in historic urban areas, the renovation of old residential districts mainly focuses on small-scale, gradual micro-renovations. The first step is to improve the quality and functionality of idle public spaces in the community, such as community entrances, small squares, and small parks, to tap the potential of the spaces and improve the community environment and residents' lives. For the spatial renovation of old residential districts with street and alley layouts, since streets and alleys are important places for people to move around, gather and interact, and the residential districts often con-

tain a large number of traditional style blocks and historical buildings, it is necessary to pay attention to the protection and inheritance of traditional culture, and adopt spatial stitching methods to restore the spatial texture of the blocks, so as to ensure the historical authenticity, life authenticity and morphological integrity of the community. For the public spaces of parallel-layout old residential districts, focus should be placed on revitalizing inefficient spaces in the community, enhancing the recognizability and continuity of public spaces, and paying attention to the installation of small-scale furniture in public spaces during the renovation process, such as adding flower beds, steps and other informal seating elements, as well as interesting urban furniture, to create comfortable settings for pause, interaction, and spontaneous social exchange in public spaces.

2.2.2 Utilizing catalytic elements to enhance the vitality of community spaces

The public spaces of old residential districts in historic urban areas, as the accumulation and microcosm of urban development, have unique historical and humanistic characteristics. Therefore, in addition to meeting the residential functions of residents, the traditional streets, courtyards, and individual buildings in the community often also serve cultural, tourism, and commercial functions. According to the “Urban Catalyst Theory”, a catalyst can be a material form, a specific space, or a non-material form, such as cultural elements like history and folklore. Suitable catalytic elements can be selected and implanted through urban design methods [12] so that they can interact with the surrounding environment, inject vitality into public spaces, and thus promote regional sustainable development. Catalyst elements can be either modern elements that differ from the original residential area, engaging in dialogue and collision with tradition to create new cultural symbols, or elements that are integrated into the original residential area while preserving its features, implanting or upgrading business models to generate catalytic effects with commercial and cultural characteristics.

2.2.3 Strengthen resilience and enhance risk resistance capabilities

In the renovation of public spaces in old residential districts, resilience building should be strengthened to enhance spatial continuity, openness, and functional diversity. A three-in-one resilient public space of “point-line-plane” should be formed in the community, supplemented by public service facilities and fitness equipment, to create a healthy and resilient community for residents. “Points” refer to the cleanup and revitalization of small street corner spaces and inter-building green spaces in the community, transforming them into small plazas, green spaces, and pocket parks. Combined with the construction of sponge cities, these serve as basic units of resilient spaces, providing residents with a place to rest and socialize, and can also be flexibly transformed into fitness spaces, information display areas, or gathering areas between houses and street corners for emergency epidemic prevention and disaster relief. “Lines” refer to the road spaces in the com-

munity, such as streets, alleys, and small paths between houses, which are linear public spaces with pedestrian flow guidance. Through clear and smooth linear public spaces, the “point” public spaces in the community are connected, guiding people to more spacious and open “plane” public areas, such as public roads and large squares. Through the resilient construction of old residential district spaces, the overall risk resistance capacity of the residential district is improved.

2.3 Governance strategies-multi-party collaboration and emotional connection

The difficulty in reconstructing old residential districts lies not only in the allocation of material space resources but also in the conflicting interests and demands of various stakeholders. This is especially true for old residential districts in historic urban areas, which bear witness to the city’s history and civilization and contain many historical and cultural relics and buildings. Therefore, the people concerned about the renovation include not only the residents of the community, but also experts, scholars, public welfare organizations, and volunteers from all walks of life. Therefore, in the renovation of old residential districts in historic urban areas, in addition to residents, government, developers, and planners, it is necessary to add independent third parties such as experts, scholars, teaching and research personnel, non-profit public welfare organizations, etc., but with relevant experience and ability, and establish third-party organizations [13]. During the renovation process, through coordination and supervision, reasonable demands can be put forward, the rights and interests of multiple parties can be balanced, and the coordination and resource allocation of the renovation process can be facilitated.

At different stages of the transformation, relevant information channels should be increased to enhance public participation (Table 2). For example, during the pre-renovation research stage, a detailed questionnaire survey and interviews should be conducted to understand residents’ needs, and resident forums should be organized; during the renovation plan development process, residents should be organized to hold plan seminars to discuss and vote on important decisions such as renovation content, community governance model, and pro-

ject funding; during the renovation implementation process, residents' feedback on the implementation site should be collected, and forums should be organized between residents and the implementation team to address problems and needs encountered during implementation; in the post-renovation management phase, resident representatives can be organized to join the community management team for joint management.

Furthermore, communities are encouraged to establish so-

cial organizations based on shared traditional cultural backgrounds, occupational ties, or common interests and hobbies among neighbors. These community social organizations can take the lead in organizing activities and promoting relevant culture. This not only enriches the cultural connotation of the community but also enhances community cohesion and residents' sense of belonging, ultimately realizing a model of multi-stakeholder co-governance, co-construction, and sharing.

Table 2 Overview of information channels and public participation methods at each stage of the renovation

Stage	Participation content	Participation methods	Community information channels	Information
Pre-renovation survey	Residents' needs survey before renovation	Answering questionnaires, participating in interviews, and attending resident forums	Community bulletin boards, property management WeChat groups, community official accounts, community broadcast announcements, and door-to-door surveys	Demand questionnaire, renovation project approval status
Renovation scheme formulation	Scheme design, scheme revision, scheme publicity, and fundraising	Providing schemes, providing funding, and supervising	Participating in seminars, related websites, community bulletin boards, property management WeChat groups, community official accounts, community broadcast announcements, and newspapers	Renovation project, renovation area, investment funds, renovation timeline, renovation design team, channels for participating in the renovation design, and public notice documents related to the renovation
Implementation of the renovation scheme	Construction of various schemes	Participating in supervision, implementation, and resident forums	Community bulletin boards, property management WeChat groups, community official accounts, community broadcast announcements, construction sites, and online broadcasts	Renovation project, renovation area, renovation duration, renovation implementation team, and participation methods in the renovation implementation
Post-renovation management	Property management and operation funding	Joining the management team as a resident representative and providing funding	Community bulletin board, community property management WeChat group, community official account, community broadcast announcements	Management content, management team, channels for participation in management, and public disclosure of community management funds

3 Implementation modes for the renovation of old residential districts in historic urban areas

The renovation of old residential districts involves different entities such as the government, enterprises, residents, and other civic stakeholders. Based on the different implementing entities and their respective roles in the implementation process, the main implementation modes for the renovation of old residential districts include: The government-led mode; the government-guided, enterprise-implemented mode; the government-led, resident-participating mode; the government-guided, resident-led mode [14]; and the multi-stakeholder joint implementation mode (see Table 3 for details). Different implementation modes will

inevitably yield different outcomes. To ensure the effective implementation of the renovation schemes, old residential districts in historic urban areas should adopt a multi-stakeholder joint implementation mode.

4 A case study of the renovation of old residential districts in historic urban areas: The Old Nanhai County Community in Liurong Subdistrict

4.1 Community overview

The Old Nanhai County Community (hereinafter referred to as the Old Nanhai Community) is located within the core protected area of the historic cultural block centered on the Temple of the Five Immortals, Huaisheng Mosque, and the Temple of the Six Banyan Trees. It was

named after the former Nanhai County yamen site dating to the Ming and Qing dynasties (Figure 1). The community has a total land area of approximately 4.28 ha, with 359 residential buildings, approximately 1,840 households, and 5,155 residents. The community has many historical and cultural relics, including one historical building and 72 traditional architectural traces from the Republican era. The community contains the best-preserved early Republican era buildings and is a typical representative of modern collective housing in Guangzhou and a community with the “Quintessential Guangzhou” characteristics [15]. The existing buildings in the central area within the renovation area are mainly Western-style or Sino-Western hybrid buildings from the 1920s, mostly 2 to 4 stories high, inclu-

ding the former site of Ta Kung Pao newspaper and the former residence of Chen Jitang, the “King of the South” (a powerful warlord in the People’s Republic of China era) of the People’s Republic of China. The community is surrounded by numerous Buddhist temple ruins, including the Temple of the Six Banyan Trees and Guangxiao Temple to the north, and the Huaisheng Mosque to the south. The community is bordered by the 500 m-long arcade street of Zhongshan Sixth Road to the south. Within walking distance are cultural attractions such as the General’s Mansion Ruins, People’s Park, and the former site of the Guangzhou Commune. Heading east along Zhongshan Sixth Road leads to the Beijing Road Cultural Tourism Area.

Table 3 Overview of different types of renovation modes for old residential districts

Mode	Main content	Advantages	Disadvantages
government-led mode	The government is the main investor and builder	—	The government is under great financial pressure and cannot sustain the implementation of subsequent projects as originally planned
Government-guided, enterprise-implemented mode	The government initiates the project, signs a land transfer contract with a company, and the company organizes the relocation of residents and project construction. The completed houses are used for resident resettlement and sale or commercial operations	It could alleviate the pressure on government funding	It is prone to problems such as loss of authenticity, poor residential continuity, and over-commercialization
Government-led, resident-participating mode	The government bears the primary responsibility, while residents offer suggestions or participate in the implementation of the renovation project as decision-makers and collaborators	It could reduce conflicts and meet needs	The funding sources are relatively limited, incurring high communication costs
Government-guided, resident-led mode	The government constructs infrastructure and other external resources, while residents renovate their residential buildings and the community’s public environment themselves	The renovation is small in scale, short in duration, and flexible in approach	It could easily lead to technical problems related to renovation, as well as issues affecting public interests and historical character
Multi-stakeholder joint implementation mode	It integrates the efforts of the government, the market entities, society, and residents	It could avoid problems such as unsustainable funding or over-commercialization	The renovation project poses high requirements for the leading and technical support parties, and requires specific suitability for the targeted community

4.2 Main renovation contents

4.2.1 Material space (Hardware)

(1) Infrastructure and public services

In terms of infrastructure improvement, the Old Nanhai Community carried out the renovation of the “three lines” (power, telecommunications, and broadcasting cables) and the integration of the “four lines” (telecommunications, broadcasting, etc. aerial cables), installed lighting facilities, standardized

the setting of garbage collection points, installed a community video surveillance system, and added express delivery lockers. The community also renovated the underground pipe network to improve the water supply, drainage, and sewage system, achieving the separation of stormwater and sewage systems. Simultaneously, community roads and damaged walkways between buildings were repaired, with paving styles, colors, and materials modified to better match the cultural atmosphere of the historical district.

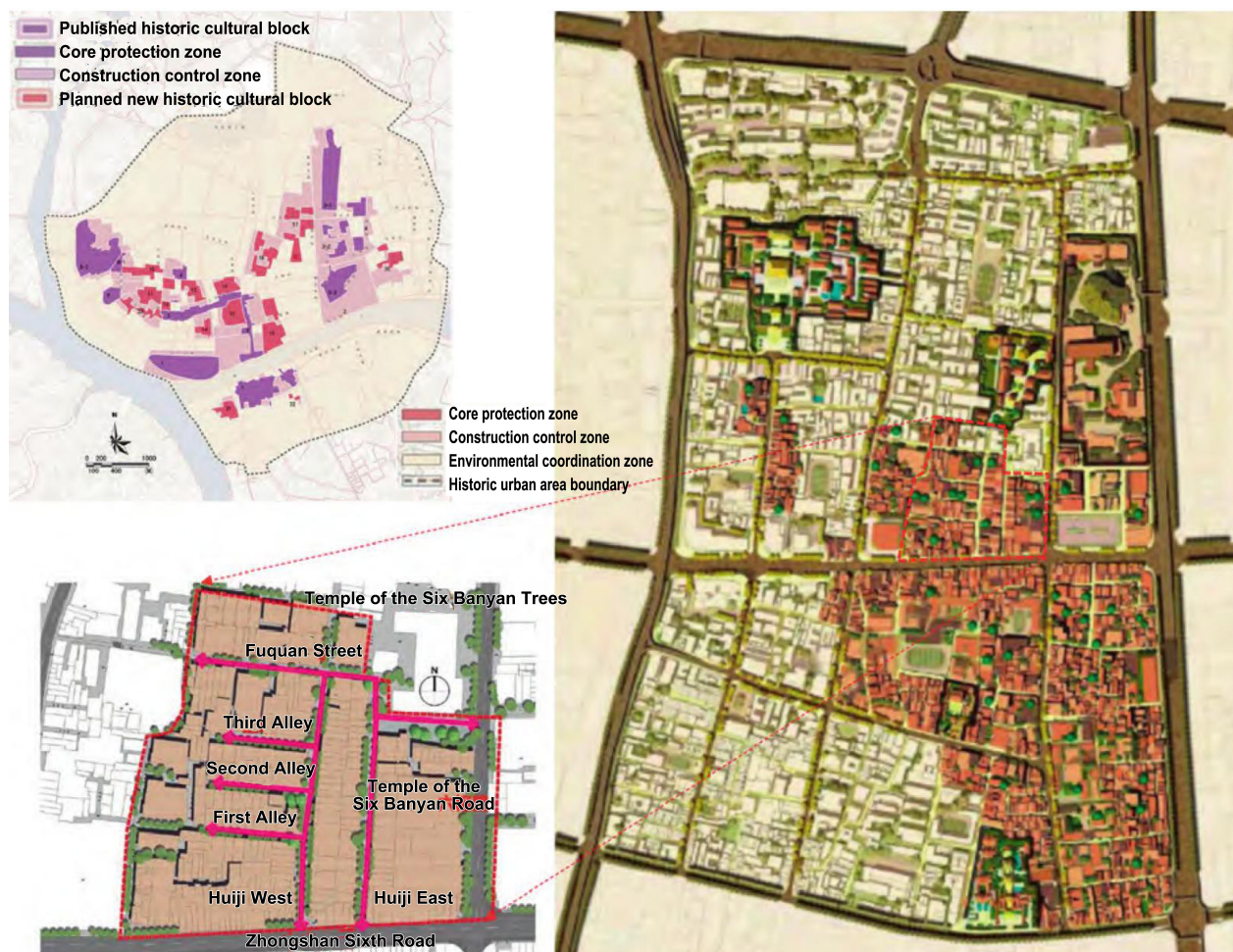


Figure 1 Location map of the Old Nanhai Community

After addressing these livelihood shortcomings, the community delved into the cultural heritage of historical buildings, such as the former site of the Ta Kung Pao newspaper. These historical buildings were revitalized and utilized to highlight the community's cultural atmosphere and reshape the spatial ambiance of the streets and alleys. Serving as a spatial catalyst, the Ta Kung Pao site facilitated the introduction of commercial services such as cafes, convenience stores, and bars (Figures 2 and 3). This integration of historical architecture with modern, experience-oriented commerce successfully promoted the improvement of business quality.

In addition, the Old Nanhai Community has taken into account the needs of the elderly in improving public service facilities. There are grassroots housekeeping service stations in the community, mainly targeting home care for the elderly, housekeeping services, and maternal and infant services. At the same time, there is a canteen in the

community that provides three meals a day for the elderly in the community, providing facilities and channels for catering, health, and door-to-door home care services for the elderly in the community. Market-oriented services and smart platforms have been introduced to assist in the monitoring and management of the elderly in the community.

(2) Public space

The renovation of streets and squares aims to improve the quality of the space. The renovation included refurbishing the Huiji West entrance space, Liurong Street Cultural Square, and Ta Kung Pao Square, repainting and renovating the community archway, and repairing the landscape wall. Meanwhile, stone tables and chairs, rest benches, and rest pavilions were added to the central activity square, the space in front of the shops along the street was renovated, public furniture was added, and elderly-friendly barrier-free facilities were built in the public space.



Figure 2 Public service facilities in the Old Nanhai Community



Figure 3 Introduction of market-oriented public service facilities



Figure 4 Schematic diagram of greening renovation

The green landscape was transformed, and the bonsai were reorganized, adopting the strategy of “preservation, trimming, thinning, and enhancement”. Based on residents’ opinions and the actual lighting conditions, trees with large diameter at breast height and good growth were retained in the site; trees overgrown or disorganized branches that seriously affected residents’ travel and life were tidied up; trees with serious pests and diseases that endangered residents’ safety, small diameter at breast height and poor growth were thinned out and

removed; finally, group-style greening and local movable flower boxes were added to the public space (Figure 4).

In terms of architectural space renovation, the project includes refurbishing the facade, repairing and installing intercom systems for building entrances, painting corridors, repairing stair treads and handrails, repairing fire-fighting equipment and building safety facilities, repairing and installing corridor lighting, and restoring the Historic Feature Building (Figure 5).



Figure 5 Elderly-friendly public space renovation

4.2.2 Community governance and services (software)

(1) Management mechanism and digital management construction

The community explored community self-governance models and maximized the coordinating role of grassroots organizations. With the community Party organization at its core, a community deliberation platform is formed with the broad participation of resident representatives, building leaders, representatives from local units, and social organizations. Standardized rules for consultation and deliberation are established, and renovation-related matters are included in the scope of consultation and deliberation. Through equal, rational, and peaceful consultation, the community’s conditions and opinions are fully reflected and understood, and community issues are jointly resolved through consultation.

As a demonstration project for the construction of 5G smart communities, the Old Nanhai Community mainly includes intelligent pedestrian access, intelligent security, and intelligent management. At the same time, a smart community service platform (Figure 6) has been built in the community, which can monitor key areas, key personnel, unrecognized individuals, population density, fire lane obstruction, and littering

in the community, and display the information on the smart platform and issue alarms. The community also monitors the health status of elderly people living alone in real time by equipping them with smart bracelets, and issues timely warnings when abnormalities are detected.

(2) Public participation

Before the community renovation, a “co-creation” workshop was established as a project discussion platform, a collaboration platform, recruitment posters were issued, residents’ needs were proactively understood, social forces were actively guided, and diverse participation in community renovation and construction was promoted. A working mechanism for the joint participation of the government, the market, residents, and designers in community renovation was established. During the renovation process, on-site coordination meetings were held to strengthen project safety and quality management, and to jointly discuss, build, and govern the project; the responsibilities and division of labor of each unit and department were clarified to form a working synergy, jointly solve problems, and coordinate the implementation of the project; complaint and reporting channels were opened to maximize the role of social supervision and promote the

implementation of the renovation work; and community residents and university teachers and students were attracted

to participate in the community renovation through participatory design (Figure 7).

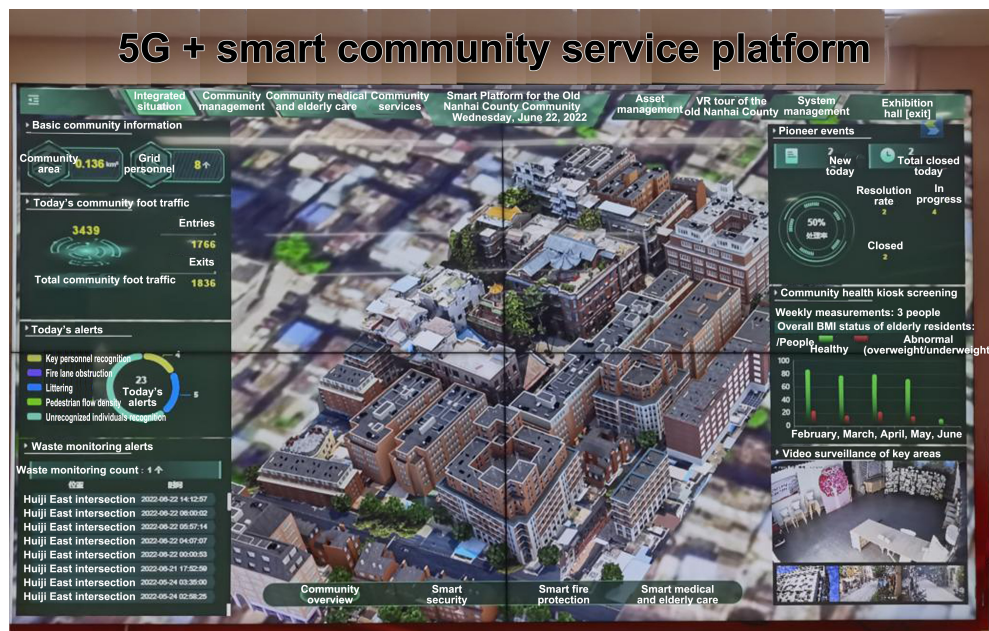


Figure 6 Smart platform construction



Figure 7 Multi-stakeholder participation in the community design phase

In the daily management of the renovated community, a homeowner self-governance model is adopted. The community's management mode, regulations, and homeowner

deliberation rules are all confirmed through joint consultation by the residents, and then basic management is carried out by the community street office to jointly maintain the

results of the renovation. Establish and improve the mechanism for raising special maintenance funds in communities, with residents making supplementary or renewed contributions to support construction and renovation, guiding specialized enterprises to fulfill their social responsibilities, implementing subsequent maintenance and management of pipeline facilities and equipment, and promoting the participation of social forces in management.

Based on history and culture, carry out community activities and cultural promotion. The Old Nanhai Community carries out a variety of community activities, mainly promoting the community's history and culture, popularizing scientific knowledge, and carrying out activities for specific groups such as the elderly and children. Community activities help strengthen the relationship between the community residents' committee and residents, as well as among the residents themselves. Residents showed good participation and positive feedback regarding these activities.

(3) Community culture and community sentiment

The renovation of Old Nanhai Community focus on exploring and revitalizing historical heritage to improve the quality of life for residents. To highlight the overall design concept of "one brand per street" and "one characteristic per community", the historical building of "Ta Kung Pao Former Site" in the community is revitalized

and utilized according to the principle of "restoring the old as it was" to create a community mural historical and cultural wall, highlighting the community's cultural atmosphere and reshaping the place atmosphere of the street. It also guides residents to participate in the beautification of electrical boxes and mailboxes with graffiti, highlighting the characteristics of art being close to residents' lives and improving community services.

Relying on its own history and culture, the community uses the space of historical buildings as a carrier to set up a Party building education and cultural station, which displays and promotes the community's historical evolution and cultural construction. Educational films are also shown regularly to enrich the spiritual and cultural life of community residents. In the square space in front of the former site of Ta Kung Pao Square, the community's cultural history is publicized and displayed, so that residents can become familiar with the community's history and culture and increase their sense of community belonging and identity. Targeting the elderly and children in the community, community activities are carried out in conjunction with public spaces, including safety education for children, free health checkups for the elderly, and festive activities during holidays, creating new collective memories for community residents (Figure 8).



Figure 8 Community activities promote collective memory among residents

4.3 Analysis of the indicator system

To gain a more objective understanding of the renovation situation, this paper establishes an indicator system for the renovation of old residential districts from both the hardware and software aspects of the community. The system consists of material space and community governance and services as level-1 factors, 5 level-2 factors, and 16

level-3 factors. A group composed of experts in related fields, staff of relevant departments, front-line designers, community managers, and resident representatives was invited to score the importance of the factors. The weight of each factor in the indicator system was determined using the analytic hierarchy process (AHP)²⁾ (Table 4), and a method for evaluating the indicator factors was proposed.

Table 4 Weighting of indicator factors for the renovation of old residential districts

	Level-1 factor (Criterion Level)	Level-2 Factor (Criterion layer)	Level-3 factor	
A1: An indicator system for the renovation of old residential districts based on the "Complete Community" concept	B1 Hardware: Community material space (0.7679)	C1 Public service facilities (0.0956)	D1	Basic public service facilities (0.0660)
			D2	Market-based public service facilities (0.0296)
		C2 Municipal supporting facilities (0.4781)	D3	Water, electricity, gas, heating, telecommunications networks, and sanitation facilities (0.2234)
			D4	Transportation facilities (0.0653)
			D5	Security facilities (0.1606)
			D6	Smart facilities (0.0288)
		C3 Publicspace (0.1942)	D7	Streets and squares (0.0281)
			D8	Green landscape (0.0242)
			D9	Epidemic and disaster prevention space (0.0532)
			D10	Architectural space (0.0887)
	B2 Software: Community governance and services (0.2321)	C4 Community governance (0.1653)	D11	Community management mechanism completeness (0.0164)
			D12	The level of digital management construction in the community (0.0094)
			D13	Public participation level (0.0459)
			D14	Residents' satisfaction with community services (0.0936)
		C5 Community economy and culture (0.0668)	D15	Community economy (0.0231)
			D16	Community culture (0.0437)

The weighted scores of each factor in the indicator system were statistically analyzed, and the improvement of the factor was described by classifying the scores according to the ratio of the scores to the full score of the factor. It can be seen that the overall condition of the community hardware construction in the Old Nanhai Community is relatively good. This indicates that the renovation of the common parts of the building and the public areas of the community has significantly improved the living environment of the old district, and the residents are relatively satisfied with the hardware renovation. The specific factor scores and levels are shown in Table 5.

4.4 Suggestions for improvement and optimization

At present, the government is still the main source of funding for the renovation of the Old Nanhai Community. Based on the idea of reconstructing old residential districts in Guangzhou in a contiguous manner, the Old Nanhai County Community, as a typical example in the area, should have a radiating effect on the surrounding old residential areas. Its relatively complete public service facilities, especially elderly-friendly services such as the

elderly canteen, can be opened to the surrounding residents at staggered times. This approach can help the surrounding old residential areas that are undergoing renovation to improve their living environment to a certain extent during the transition period between construction and completion.

In shaping public spaces, utilizing public spaces to build community epidemic prevention and disaster prevention systems, and enhancing community resilience are also important aspects of public space construction. In the micro-renovation of plazas and green spaces, the construction of sponge cities should be combined to make them basic units of resilient spaces, so that they can not only serve as a place for residents to rest and socialize, but also be flexibly transformed into fitness spaces, information display areas, or emergency epidemic prevention and disaster relief gathering areas between houses and street corners.

In addition, as a demonstration project for the construction of 5G smart communities, although a smart community service platform has been built in the community, it has failed to fully utilize the platform's function of providing community services and achieving community gov-

ernance by integrating resources. As a result, community residents are not very willing to use smart devices to obtain corresponding services. Going forward, efforts should be made to strengthen the construction of smart infrastruc-

ture to match this, improve the terminal equipment and methods for sensing and monitoring, as well as the functions for collecting related data and information, and expand the promotion of smart services.

Table 5 Comparison of weighted scores of case communities

Level-1 factor	Level-2 Factor	Level-3 factor		Old Nanhai Community Weighted score	Percentage/%	Score level	
B1 Hardware: community material space	C1 Public service facilities	D1	Basic public service facilities	4.75	67.8	Good	
		D2	Market-oriented public service facilities	2.25	75.1	Fairly Good	
	C2 Municipal supporting facilities	D3	Water, electricity, gas, heat and telecommunications facilities	15.77	71.7	Fairly Good	
		D4	Transportation facilities	4.53	64.7	Fairly Good	
		D5	Security facilities	11.79	73.7	Fairly Good	
		D6	Smart facilities	1.92	63.9	Good	
	C3 Publicspace	D7	Streets and squares	2.06	68.8	Good	
		D8	Green landscape	1.81	90.3	Excellent	
		D9	Epidemic prevention and disaster relief space	3.64	72.8	Fairly Good	
		D10	Architectural space	6.12	68.0	Good	
	Hardware score			54.64	70.1	Fairly Good	
	B2 Software: community governance and services	C4 Community Governance	D11	Completeness of management mechanism	1.31	65.6	Good
			D12	Digital management of communities	0.79	79.0	Fairly Good
			D13	Public participation	3.20	64.1	Good
D14			Residents’ satisfaction with community services	6.87	76.3	Fairly Good	
C5 Community economy and culture		D15	Community economy	1.85	92.4	Excellent	
		D16	Community culture	3.04	76.0	Fairly Good	
Software score			17.07	74.2	Fairly Good		
Total score (out of 100)				71.70	71.7	Fairly Good	

Conclusions

This paper first highlights the importance of reconstructing old residential districts in historic urban areas for preserving the urban cultural context and promoting urban development. Accordingly, it establishes the renovation principles of adapting to local conditions while respecting history and preserving authenticity. Subsequently, specific strategies are proposed for the renovation of material spaces (both facilities and public spaces) and the enhancement of community governance and services.

First, regarding facility renovation, focus should be placed on the marketization of public services by encoura-

ging the establishment of community social enterprises to supplement public offerings. Furthermore, community culture and image should be highlighted by guiding the upgrading of cultural and commercial facilities. To address the shortage of space for new facility construction, it is advocated to explore the functional compatibility of existing facilities, promoting their utilization in staggered time periods and composite spaces.

Second, in the renovation of public spaces, priority must be given to the protection of the cultural context and urban fabric, utilizing catalytic elements to inject vitality into community public spaces.

Third, for community governance, it is essential to

facilitate multi-stakeholder participation. This involves expanding information channels and participation pathways to promote continuous public involvement throughout the entire renovation cycle. Moreover, the formation of independent social groups acting as third-party organizations is highly encouraged; this approach helps navigate complex stakeholder dynamics, coordinates diverse interests, and ensure effective implementation of renovation plans. Additionally, significant attention must be paid to cultural construction to foster a strong sense of community belonging among residents.

Furthermore, based on a comparative analysis of common renovation modes, the paper concludes that a multi-stakeholder joint implementation mode is the most suitable approach for old residential districts in historic urban areas.

Finally, using the Old Nanhai Community in Liurong Subdistrict as a case study, an indicator system was established. By analyzing the renovation outcomes from both material space (hardware) and community governance and services (software) dimensions, targeted suggestions for further improvement and optimization were formulated.

Sources of Figures and Tables

Figure 1: Redrawn by the author based on available materials;

Figures 4, 5, and 7: Provided by Guangzhou Urban Renewal Planning Institute;

Figure 8: Provided by the former Nanhai Community Residents' Committee;

All other figures and tables were photographed or drawn by the author.

Notes

1) The concept of "Complete Community" was first proposed by Wu Liangyong at the 2010 Shanghai World Expo. He believes that the community is the most basic living place for people, and its planning and construction should start from the vital interests of residents. It includes

not only the shaping of the material space of housing, but also many other factors such as services, security, education, and transportation. The construction of a Complete Community, which includes both hardware and software, is a systematic social project.

2) The Analytic Hierarchy Process (AHP) is a systematic and hierarchical analysis method that combines qualitative and quantitative approaches, proposed by the famous American operations researcher Thomas L. Saaty. This method can quantify the relevant experience of multiple decision-makers, and is suitable for situations with complex target structures and a lack of data. It is a simple, flexible, and practical multi-criteria decision-making method.

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