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South China University of Technology

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Study on the Renewal of Public Space in Dual-Aged  
Communities under the Concept of Complete  
Community: A Case of Shigang Community in

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**Study on the Renewal of Public Space in Dual-Aged  
Communities under the Concept of Complete Community:  
A Case of Shigang Community in Guangzhou**

A Dissertation Submitted for the Degree of Master

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# Abstract

With the development of China's urbanization process, in recent years, the development of cities has shifted from the incremental expansion mode of high-speed growth to the development strategy of stock renewal. At the same time, with the accelerated pace of aging and social problems, the urban community renewal represented by “Dual-aged communities”, i.e., old communities with seriously aging residents, has become a prominent challenge for sustainable urban development. The traditional urban renewal model often focuses on macro-intervention, using a “top-down” approach to update the current situation of the community to a certain extent, however, such a renewal model is difficult to meet the needs of the elderly for physical space renovation, spatial aging adaptability design, reshaping of cultural core and transformation of community renewal and community management in the context of the dual-aged community. However, in the context of dual-elderly communities, it is difficult to meet the needs of the elderly for material space transformation, ageing-friendly design, cultural core reshaping and community management mode. Based on the current context, the study introduces the concept of complete community, emphasizing the wholeness and comprehensiveness of the community, and aims to explore the systematic strategies and methods to improve the public space of the community by emphasizing the systematic theoretical analysis and practical research on the three dimensions of hardware, software and spirit.

The study firstly discusses the origin and development of complete community, summarizes the guiding significance of the theory of complete community for dual-aged community renewal in China, and analyzes urban community renewal cases under similar concepts in order to reflect their suitability for the research object and serve as a comparison group for the evaluation system later. Secondly, the construction of the fuzzy comprehensive evaluation system is completed by sorting out the three dimensions and five main influencing elements of the public space of complete community, determining fifteen specific indexes and the specific weights of each index, and establishing the quantitative evaluation criteria

corresponding to each index through the sorting out of the relevant contents. After that, through the specific and detailed research on Shigang community, we sort out the specific conditions and problems in various aspects, and make a comprehensive evaluation of the research results, and derive the evaluation results to analyze the key problems. At the same time, based on the previous theoretical research, we formulate the principles, objectives and strategies of dual-aged community renewal under the concept of complete community, determine six basic renewal strategies under three dimensions, summarize the specific renewal methods to form a complete system, and form a renewal method that can provide theoretical references and practical guidance for the renewal of other similar communities.

Finally, by integrating the research content and evaluation results, the public space of Shigang community renewal design is targeted to optimize the spatial layout and environmental quality, improve the spatial level of the community intelligence services mechanism to promote the role of the elderly care and humanistic compensation, and summarize the method of public space renewal of the complete community at the design level, to provide the design level reference for the similar research.

**Keywords:** Complete community; Dual-aged community; Public space; Community renewal



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## Chapter 1 Introduction

### 1.1 Research Background

#### 1.1.1 Challenges of Ageing in the Context of Urban Renewal

Since the reform and opening-up, the rapid development of China's economy has promoted the acceleration of the urbanization process, and the construction of cities has shown unprecedented vitality and scale. During this period, the rapid advancement of urbanization gave rise to a huge demand for construction land, prompting the continuous expansion of urban boundaries outward, forming a typical pattern of outward development. While the rough urban expansion that lasted for more than 30 years greatly contributed to economic growth and urban modernization, it also gradually exposed a series of problems. Among them, the most notable is the sharp conflict between the unlimited expansion of urban physical space and the limited environmental carrying capacity and supply of natural resources, which not only restricts the sustainable development of cities, but also triggers a profound reflection on the traditional urban development model.

In the face of this challenge, China's urban development model is gradually undergoing a shift from incremental to stock-based development, marking a strategic adjustment from the pursuit of “incremental development” to a focus on “stock-based quality improvement”. This transformation means that the focus of Urban Renewal is no longer on simply adding new land for construction, but on optimizing the use of existing urban space, emphasizing the redevelopment of land in stock and the renovation and upgrading of existing buildings. Stock enhancement and renovation has become the core issue of urban development in the new era, with the goal of improving the efficiency and quality of urban space through refined management and innovative design, and realizing the connotative development of the city. In this context, the evaluation standard of urban development has fundamentally changed. Instead of maximizing land value as the only pursuit, more attention is paid to improving the living environment of residents, upgrading the comprehensive functions of the city, and enhancing the quality of life of citizens. This transformation is reflected not only in the

transformation of urban hardware facilities, but, more importantly, in the emphasis placed on the soft power of the city, that is, through the creation of an urban environment that is pleasant to live in and work in, the promotion of social harmony and cultural prosperity, and thus the enhancement of the overall competitiveness and attractiveness of the city.

In summary, the transformation of China's urban development model is an inevitable product of economic and social development at a certain stage, and a strategic choice to cope with the new challenges emerging from the urbanization process. This transformation is not only a revolution in the way urban space is utilized, but also a sublimation of the concept of urban development, aiming at building a greener, more intelligent, more inclusive and sustainable urban future.

Population ageing and the urbanization of the ageing population are two of the major global demographic issues to be faced in the first half of the twenty-first century. Official data from the Ministry of Civil Affairs predict that China will enter a “moderately ageing” society in less than five years, with an elderly population approaching 300 million. In terms of demography, population transition models indicate that the world is rapidly ageing, with the proportion of people aged 60 and over in the global population rising from 10 per cent in 2000 to 22 per cent in 2050; and the number of elderly people in the senior age group will rise accordingly, with those aged 80 and over accounting for close to 10 per cent of the world's population by 2050<sup>[1]</sup>. The status quo and trend of population aging have put forward new challenges to the tasks of Urban Renewal and stock enhancement and renovation. How to meet the aging needs in Urban Renewal activities is not only a key means of upgrading urban functions and optimizing the urban environment, but also a necessary way of adapting to the aging society and meeting the special needs of the elderly.

### 1.1.2 Needs and Practical Dilemmas of Dual-aged Community Renewal

China's residential construction from the founding of the country began to the right track, until after the reform and opening up, and began a new wave of residential construction. Guangzhou City, for example, old neighborhoods in Guangzhou City is not only “old”, but also “more”, now the existing scale of old neighborhoods in Guangzhou City is very huge,

according to the Guangzhou Urban Renewal Bureau of mapping statistics show that the city was built before 2000, there is an urgent need for renovation of 779 old residential neighborhoods, involving 2.6 million residents, accounting for about 2.6 million of the city's residents, the old residential neighborhoods. According to the Guangzhou Urban Renewal Bureau's survey statistics, there are 779 old residential neighborhoods in the city built before 2000, involving 2.6 million residents, accounting for about 31% of the city's household population. At present, due to the limited nature of urban space resources, China's urban construction model has undergone a remarkable transformation. It has shifted from the previous epitaxial expansion to a more refined and intensive development mode, and the focus of urban development has gradually changed from incremental expansion to stock optimization. In this context, Urban Renewal and transformation of old neighborhoods have become important issues in current urban construction.

单位: %					(%)
普查年份 Census Years	各年龄段人口比重 Proportion of Population by Age Group to National Population				
	0-14	15-59	60+	*65+	
1953	36.28	56.40	7.32	4.41	
1964	40.69	53.18	6.13	3.56	
1982	33.59	58.79	7.62	4.91	
1990	27.69	63.74	8.57	5.57	
2000	22.89	66.78	10.33	6.96	
2010	16.60	70.14	13.26	8.87	
2020	17.95	63.35	18.70	13.50	

Figure 1- 1 Proportion of Chinese population by Age Group

(Source: Bulletin No. 5 of the Seventh National Census)

Dual-aged communities, i.e. those communities with old buildings and aging residents, are a complex and multidimensional issue. With the arrival of the aging society, Dual-aged community renewal is not only an important part of Urban Renewal, but also the key to improve the quality of life of the elderly. As a symbiosis of old communities and aging residents, Dual-aged communities renewal activities face profound renewal needs and realistic dilemmas that cannot be ignored. These dilemmas span a variety of dimensions, such as

age-appropriate renovation, upgrading of the physical foundation, transformation of the community management model, and reshaping of the cultural kernel, which constitute the challenges that must be faced in the renewal of Dual-aged communities.

First, the primary need of Dual-aged communities is ageing-friendly renovation. As they age, the physical functions of older persons gradually decline, and they have higher requirements for the safety, convenience and comfort of the living environment. However, the reality is that many old communities have aging infrastructure and lack the necessary ageing-friendly design, which brings many inconveniences to the daily life of the elderly. Ageing-friendly renovation should aim to meet the special needs of the elderly and improve their quality of life through the addition of barrier-free facilities, the enhancement of the safety of the living environment, and the ageing-friendly design of public services. Second, the material foundation is the material guarantee for Dual-aged community renewal. The material foundation of the community, including building structures, public facilities and service facilities, is in urgent need of repair and modernization. In reality, due to historical legacy problems and a lack of maintenance funds, these infrastructures have serious problems of aging, affecting the quality of life of residents<sup>[2]</sup>. Thirdly, community management is an important link in the renewal of Dual-aged communities. Good community management not only enhances the quality of life of residents, but also strengthens the cohesion of the community. In reality, the level of property management in many Dual-aged communities varies, and there are problems such as chaotic management and lack of services, etc. Due to the lack of professional property management in some of the unit-based old communities, the community management and service parties often lack professional management experience and service awareness, which makes it difficult to satisfy the high demand of the elderly for community services and requirements<sup>[3]</sup>. Fourth, the cultural core is the spiritual pillar of the Dual-aged community. Community culture includes not only material culture, such as the architectural style and landscape design of the community, but also non-material culture, such as the customs and habits of the community and neighborhood relations, etc. In addition to the basic cultural characteristics of the regional nature of some of the unit-based old communities,



they also include the cultural and spiritual kernel of culture and lifestyle under the collective memory, and the cultural kernel of the Dual-aged community needs to be preserved and inherited in the process of renewal, and at the same time, injected with new cultural The cultural kernel of dual-aged communities needs to be protected and inherited in the renewal process, while new cultural connotations are injected to meet the needs of the elderly for spiritual and cultural life.

To sum up, Community renewal for Dual-aged communities is a systematic project that requires comprehensive consideration and integrated planning in terms of ageing, material foundation, community management, cultural kernel and many other aspects. At the same time, it also requires the joint efforts and participation of the government, community, residents and other parties in order to truly realize the sustainable development of the community and the happy life of the elderly.

### 1.1.3 The Significance of the Complete Community Concept as a Guide for Community Renewal and Transformation

As the pattern of urban development shifts from incremental expansion to stock enhancement, Urban Renewal faces unprecedented challenges. This shift requires the integration of Urban Renewal with areas such as community building and community governance to respond to the different needs of diverse and complex interest groups, with the ultimate goal of building high-quality urban spaces<sup>[4]</sup>.

As early as 2011, academician Wu Liangyong proposed that community planning and construction should be based on the immediate interests of grass-roots residents as the starting point, to promote the construction of “Complete community”<sup>[5]</sup>. In July 2019, Huang Yan, Vice Minister of Housing and Urban-Rural Development, introduced the concept of “Complete community” into the renovation of old neighborhoods in cities and towns when introducing the work of renovating old neighborhoods in cities and towns. She emphasized that on the basis of improving basic supporting facilities and upgrading infrastructure, old neighborhoods should further improve public service facilities to achieve the goal of “Complete community”. The concept of Complete Community emphasizes the wholeness and

comprehensiveness of the community, aiming to achieve sustainable development of the community by taking into account the various needs and functions of the community in a comprehensive manner. This concept is an important guide for the renewal and transformation of Dual-aged communities, helping to solve existing problems, improve the quality of life of residents and enhance community cohesion<sup>[6]</sup>.

In the renewal of old communities, the Complete Community concept encourages residents to participate in community planning and governance, advocates common governance and sharing, strengthens community cohesion, ensures that renovation projects meet the needs of residents, and enhances the vitality and sustainability of the community; in addition, the Complete Community concept pays special attention to humanistic care, especially in the area of ageing and accessibility renovation, emphasizes the care for the elderly, children, and people with disabilities, and enhances the inclusiveness and safety of the community to meet the needs of residents of all age groups through optimizing community design, such as installing additional elevators, ramps, accessible restrooms, etc., to enhance the inclusiveness and safety of the community and meet the needs of residents of all ages; in terms of ecological and environmental protection, the Complete Community Concept advocates green building and sustainable development, encourages community greening, rainwater collection and utilization, and the application of energy-saving technologies, and promotes the transformation of the old community into a low-carbon and environmentally friendly direction, so as to enhance the ecological value of the community; at the level of management and service, the Complete Community Concept also actively promotes technological innovation. Complete community concept also actively promotes scientific and technological innovation and the construction of intelligent communities, and improves the efficiency of community management through the introduction of modern technologies such as intelligent security, intelligent parking, and remote medical services, providing residents with a safer and more convenient living experience. In conclusion, the Complete Community concept provides an all-round guiding framework for the renewal of old communities, which not only enhances the physical environment and functions of the community, but also

strengthens the community's social ties and cultural connotations, and is an effective path for realizing the organic renewal of the city and improving the residents' sense of well-being.

#### 1.1.4 Community Renewal Needs and Practices in Public Spaces

As an important place for residents' daily life, community public space carries a variety of functions such as socialization, leisure and entertainment, and its quality directly affects residents' sense of well-being and community cohesion. With the development of society and changes in residents' needs, the need for community public space renewal is becoming more and more prominent. Community renewal not only focuses on the functionality of the space, but also emphasizes the emotional experience and cultural connotation of the space, in order to create a more attractive and vibrant community environment, whose needs can be reflected in the integration of the functions of the community space, humanistic care and local characteristics, community participation and sharing, as well as the ecological environment and other aspects.

Scene creation, by extracting the combination patterns and characteristics of urban comforts in the community, can effectively tap into the residents' daily life memories and create a living space in line with the traditions of the community. This approach not only enhances the residents' sense of identity with their living scenes, but also increases the frequency of these scenes in their daily lives, thus further improving the quality of life in the community and the residents' sense of well-being. The application of scene theory in Community renewal research mainly includes the study of cultural scenes in creative communities<sup>[7][8]</sup>, the study of community scene creation strategies from the dimension of subjective awareness<sup>[9]</sup>, and the study of scene transformation in old neighborhoods<sup>[10]</sup>.

With the acceleration of urbanization and the diversification of residents' living needs, the renewal and renovation of community public spaces should not only meet basic functional needs, but also focus on the creation and design of spatial scenarios to enhance the attractiveness of the space and the efficiency of its use. The core of its renewal needs lies in the creation of attractive and vibrant public spaces to meet the needs of residents of different groups, ages and cultural backgrounds, as well as to enhance the overall image and quality of

the community and promote its harmonious development.

## 1.2 Subjects of Study and Basic Concepts

### 1.2.1 Old Community

Although the academic community has not yet formed a unified definition of the concept of “old community”, through a comprehensive analysis of the existing literature, it is possible to distill some of the distinctive features common to this type of community. Firstly, in terms of time dimension, most of the old communities were built in the 1980s and 1990s, and even though they have not yet reached the nationally stipulated service life, their buildings and infrastructures have already shown the traces of time, and are in urgent need of renewal and maintenance. Secondly, from a morphological point of view, these communities generally have problems of aging building appearance, obsolete or even missing public supporting facilities, and the spatial environment shows a certain degree of decay. Again, in terms of function, the public service facilities in old communities are often inadequate and the management mechanism is backward, making it difficult to meet the basic needs of modern residents for quality of life. Finally, in terms of spatial layout, most of these communities are located in the traditional central areas of the city or in the old urban areas, which used to be the core of urban development, but with the advancement of the urbanization process, their status has gradually been marginalized, and their legacy of problems has become more and more prominent.

The definition of old community is time-defined and relative, with the progress of the times and economic development, the new community has gradually become an old community, entering a continuous cycle process<sup>[11]</sup>. Referring to the definition of “old neighborhood” by the Ministry of Housing and Urban-Rural Development of China, “old neighborhood” refers to the residential areas built around 1980 to 2000, which have poor infrastructure facilities and dirty environment<sup>[12]</sup>. The old neighborhoods referred to in this paper are urban communities constructed before 2000 with incomplete supporting facilities, imperfect functions, and unsound public and social services. These communities show the

characteristics of “double aging” in function and form, and the residents have a strong willingness to transform. According to the different construction time of the community, the old community can be divided into three types: traditional neighborhood community, unit system community and street community. The old communities studied in this paper mainly refer to the original unit system communities, i.e., communities organized and built with units as the core under the planned economy. With the intervention of the market economy and the relocation or dissolution of units, these communities have gradually undergone transformation, and they are facing multifaceted problems and challenges in the context of the current Community renewal. Therefore, in-depth study and timely transformation of old communities is not only a necessary means to enhance the urban living environment, but also an important way to promote sustainable urban development.

### 1.2.2 Dual-aged Community

“Double-aged” communities refer to ageing communities, i.e., communities with ageing demographics and ageing communities. Among them, “old communities” usually represent communities built before the housing reform in 1998 and financed by the government or units, while “old communities” refer to communities with poor overall maintenance and a certain degree of aging of the buildings and supporting facilities; aging communities refer to communities with an aging demographic structure, i.e., communities with a population aged 60 and above accounting for a certain percentage of the population. An aging community is one in which the demographic structure of the community is aging, i.e., where 10% of the total population is 60 years of age or older, or where 7% of the total population is 65 years of age or older<sup>[13]</sup>. According to the Ministry of Housing and Urban-Rural Development, there are 170,000 similar communities across the country.

The aging of the physical environment and the aging of the residents are the dual challenges facing the transformation of China's old neighborhoods. Internationally, this process of simultaneous ageing of the population and the community is referred to as “Dual Aging”, i.e. the process of “double ageing”<sup>[14]</sup>. Dual-aged community in China's urbanization process occupies a special position, not only carries the historical memory, but also faces the

dilemmas and challenges of modernization and transformation, the renewal and transformation of Dual-aged community will inevitably become an important type of transformation of old neighborhoods in the future. According to the relevant literature and cases, the Dual-aged community renewal and transformation mainly faces the following challenges. First, the historical nature of the time dimension: Dual-aged communities were mostly formed in the 1980s and 1990s, or even earlier, and are witnesses to the early development of the city; with the passage of time, the appearance of the buildings and infrastructure of these communities are gradually aging, and they need to carry out the necessary maintenance and renovation; second, the aging structure of the residents: with the intensification of the aging of China's population, the proportion of the elderly population in the Dual-aged community is significantly higher, and the special needs of the residents for the living environment, and the need to maintain and renovate the community, is also a challenge. The special needs of residents for the living environment, such as barrier-free facilities, accessibility of health care services, etc., have become a factor that cannot be ignored in Community renewal; Third, the lagging behind of the functional support: due to the early construction years, Dual-aged communities often lag behind modern community standards in the configuration of public service facilities, leisure and recreational space, etc., making it difficult to meet the growing needs of residents; Fourth, the limitations of the spatial layout: Restricted by early planning, the spatial layout of the Dual-aged community may have irrationalities, such as insufficient public green space and chaotic traffic flow, which affect the quality of life of the residents and the overall appearance of the community.

From a comprehensive perspective, Dual-aged community renewal is a systematic project that requires a multidimensional approach, the comprehensive use of policy, funding, technology and other means, and the formation of a synergy between the Government, the market and society, in order to realize the comprehensive enhancement of community functions and the sustained improvement of the living environment. From the perspective of Urban Renewal and design, the future transformation of old neighborhoods must pay more attention to the special characteristics of “double-aging” settlements, and take more

systematic and comprehensive measures and design interventions to meet the needs of the elderly for community care. Such a process requires not only support and guidance at the policy level, but also the joint efforts and participation of the community, residents and all sectors of society.

### 1.2.3 Complete community

“Complete community” is a comprehensive concept of community building aimed at providing residents with comprehensive and convenient living services to meet their daily needs. This concept was first put forward by Wu Liangyong, academician of the Chinese Academy of Engineering and the Chinese Academy of Sciences, emphasizing that the community as the most basic place of life, its planning and construction should be the core of the immediate interests of the residents, covering a variety of factors such as housing, services, public security, health, education, transportation, entertainment, etc., including both hardware facilities, including software services and other content.

Complete communities are basic units that provide basic living services and facilities for residents, with a population size of 0.5 to 12,000 people. A number of Complete communities form neighborhoods, forming a 15-minute living circle, and planning for the construction of nursing homes, community hospitals, sports venues and other facilities to provide comprehensive public services. The construction of Complete Communities focuses on improving community support facilities, and its main tasks include remedying the shortcomings in the construction of community facilities, improving the quality of community construction, upgrading the level of services and enhancing governance capacity.



Figure 1- 2 Complete Community Concept Map

(Source: Complete Community Building Guide (Trial))

#### 1.2.4 Community Public Space

Community public space refers to the open space that exists between architectural entities in a community or a group of communities, and it is an open place for community residents to have public interactions and hold various activities, and its spatial quality and status have a crucial impact on the quality of life and physical and mental health of older persons<sup>[15]</sup>. Dual-aged community, due to the long time since its establishment and the large number of elderly people, there are obvious problems and dilemmas in the use of public space in the community, especially those related to the quality of space and aging, such as insufficient safety and security, the public space is often occupied by other functions, and the needs of elderly people's activities can not be guaranteed; the layout of the space and facilities is unreasonable, the space is restricted, and there is a lack of supporting facilities; the appropriate landscape layout, the public environment is not up to the demand, and the interaction between human activities and the natural environment can not be guaranteed. Inadequate layout of space and facilities, limited space and lack of supporting facilities; lack of appropriate landscape layout, public environment no longer meets the demand, and interaction between human activities and the natural environment cannot be guaranteed, and so on<sup>[16]</sup>.



The community public spaces in older neighborhoods covered in this study mainly refer to all outdoor activity areas that can be freely accessed and used in older neighborhoods built before 2000, except for residential buildings. These spaces include transportation roads, landscaped greenery, hard activity areas (such as plazas, playgrounds, fitness spaces, etc.) and infrastructure. These areas are the main carriers of daily leisure activities for residents in the neighborhoods, and also where the specific needs of community residents for public space renovation lie.

### 1.3 Research Purpose and Research Significance

#### 1.3.1 Research Purpose

As an important part of residents' daily life, the quality of community public space directly determines the residents' quality of life and spiritual fulfillment. Meanwhile, Dual-aged community has become an important topic of Urban Renewal, and the attention to the elderly and the old community is not only the call of the times, but also the embodiment of our country's development with a focus on people. In recent years, theories about community building have emerged, and Complete community has been a typical case that has had an important impact on community building in China. However, the research that combines the theoretical dimensions of Complete community with the realistic theme of Dual-aged community renewal of public space has not yet emerged, and a holistic systematic theory has not yet been formed in terms of the number and depth of research.

This study aims to explore the strategies and methods of scenario-based renewal of public spaces in Dual-aged communities under the concept of Complete community, in order to cope with the challenges posed by an aging society and to enhance the quality of life of the elderly. The main objectives of the study include: constructing a scientific evaluation system to conduct a comprehensive evaluation of the existing community public space, identifying problems and room for improvement; proposing targeted improvement measures in terms of spatial layout, environmental quality, and humanism; promoting the development of the community in the direction of greenness, wisdom, inclusiveness, and sustainability; as well as

enhancing the cohesion of the community and the sense of well-being of the residents, and so on. By combining the concept of Complete community and taking the public space of Dual-aged community as an entry point, the study tries to find specific implementation strategies and methods at the level of physical environment, spiritual needs, and service mechanism, so as to provide certain reference value for the public space renewal activities of Dual-aged community in China.

### 1.3.2 Research Significance

It is the core value of this paper to start from a realistic perspective, use a living perspective, and combine existing popular theories to solve the exact problems of contemporary urban Community renewal. We observe and sort out the current situation and contradiction points of the public space of Dual-aged community through a composite perspective, and use the comprehensive evaluation method to focus on and design the prominent aspects of the community space in order to emphasize the importance of the public space to the living scene of the Dual-aged community, guide the renewal of the public space of the Dual-aged community, improve the level of community service and management, enhance the cohesion of the community and the sense of well-being of the residents, promote the social participation of the elderly, and promote sustainable community development.

#### 1.3.2.1 Theoretical Significance

By exploring the scenario-based renewal of public spaces in Dual-aged communities, this study provides new theoretical perspectives in the field of Urban Renewal, especially in the areas of quality of life enhancement and community participation of the elderly population. It also attempts to promote the cross-fertilization of multidisciplinary theories, such as urban time, sociology, and environmental psychology, to provide a standardized evaluation system reference for the assessment of community public spaces. In addition, the study can also diffuse the idea of Complete community concept with specific community types and population structure, which clarifies the new direction and focus of community building in the context of aging.

### 1.3.2.2 Practical Significance

Based on the concept of Complete community, this paper provides a set of practical assessment tools and renewal strategies for the optimization of public space in Dual-aged communities, starting from the reality of conflicts and combining the experience of scenario-based renewal of public space. Such a strategy can, to some extent, help community managers and planners to accurately identify the current status of the space and the need for improvement, and ensure that the renovation work can actually meet the actual needs of the elderly. The scenario-based design approach in the study further enhances the attractiveness and functionality of the public space, and improves the residents' experience of using it. In addition, this study also aims to promote the participation of community residents, strengthen community self-governance, enhance the science and effectiveness of Community renewal policies, promote sustainable community development, facilitate the improvement of the community environment and the overall enhancement of the quality of life, and contribute value to the construction of a harmonious society.

## 1.4 Research Content and Research Methods

### 1.4.1 Research Content

The first chapter is the introductory part of this paper, which mainly elaborates on the research background, research object, research objectives and significance, research content and methodology, and analyzes the relevant concepts and constructs the research framework.

The second chapter continues to deeply enhance the relevant theoretical research on the basis of studying and researching the relevant theoretical and practical research on Complete community and community renewal of public space at home and abroad. It clarifies the research on the relevant theoretical supplement that is compatible with the main theory, and systematically and comprehensively combs through the development history of the theory of Complete community and the theory and practice related to community renewal, as well as its compatibility with the renewal of public space in old communities. At the same time, the corresponding representative cases are selected for the study, and three domestic and

international old community renewal cases similar to the research objectives are selected, and the renewal process and design level are scrutinized in detail from the dimension of Complete community through fieldwork and literature research, so as to provide practical support for the subsequent comprehensive evaluation and renewal design.

The third chapter is the construction of the evaluation system of public space in Complete community, through the theoretical aspects of the previous paper, following the principles of the evaluation system, the evaluation system is proposed to include five second-level indicators at the criterion level and fifteen third-level indicators at the indicator level, and the weight calculation process of the indicators at all levels is described, and finally a comprehensive evaluation system with appropriate quantitative principles is constructed.

Chapter four is the overall research on the public space of Shigang community in Guangzhou, which is designed in this paper, including the current situation research, satisfaction research, improving the collection of evaluation data, and using the evaluation system of community public space under the concept of Complete community constructed in the previous chapter 4 to conduct comprehensive evaluation with the research case, to derive and compare the results of the treatment, to summarize the current situation of the Shigang community and to provide updated weighting support for the final design. design to provide support for updating the weights.

Chapter five is the renewal strategy of Dual-aged community renewal under the concept of Complete Community. Under the principle and focus of renewal, six renewal strategies are summarized according to the three dimensions extracted from the Complete Community in this paper, and eighteen specific implementation paths under the six strategies are summarized strategically to form a strategy system of community renewal under the concept of Complete Community, which will provide a theoretical system to guide the final design. The sixth chapter summarizes the public space renewal strategy of Guangzhou Shigang community.

Chapter six is the design scheme for the Community renewal of Shigang Community in Guangzhou, i.e. the theoretical foundation, assessment system, and the comprehensive impact and application of the elaboration strategies involved in this paper. Taking Community

renewal as an urban design scheme as a starting point, the main contents and conclusions of this study are summarized, the shortcomings of this study are analyzed, and possible directions that future research can go deeper are proposed based on the shortcomings.

## 1.4.2 Research Methods

### (1) Bibliographic Analysis

The theoretical basis and practical experience of the construction of Complete community, scene renewal and community public space evaluation index system are comprehensively analyzed by systematically sorting out the relevant literature at home and abroad, including academic works, journal papers, policy documents and technical standards. The literature mainly focuses on the core elements, structural characteristics and evaluation methods of Complete community, aiming to provide theoretical support and practical reference for the clarification of the research objectives, and based on the generalization and summarization of the existing research results, it further clarifies the elemental composition of Complete community and its intrinsic characteristics, and lays a solid theoretical foundation for the construction of the subsequent evaluation index system and the research of Community renewal strategy. Provides a scientific basis for the selection of research methods.

### (2) Case Summarization Method

This study disassembles the cases of Complete Community renewal and similar concepts of old communities at home and abroad in three dimensions, compare the renewal mechanisms and summarize the experiences, analyze the renewal driving modes and practical experiences of the different cases, and lay the foundation for the construction of the evaluation system and the development of the renewal strategies at a later stage.

### (3) Analytic Hierarchy Process

In order to ensure the objectivity and scientificity of the content system for renewal and transformation of public spaces in old communities, on the basis of clarifying the transformation objectives and contents, establish a hierarchical structure framework for the content system, form the indicator factors at the guideline and indicator levels, and use the hierarchical analysis method to calculate the factor weights, and obtain the final weight values

of the indicators at all levels according to the correct weighting steps to ultimately determine the assessment system for public spaces in old communities

#### (4) Fuzzy Comprehensive Evaluation

Fuzzy comprehensive evaluation method can carry out comprehensive evaluation of multi-level, multi-factor objects, this paper according to the establishment of the Complete community public space evaluation index system, to determine the quantitative standard of each index, the use of fuzzy comprehensive evaluation method of the Guangzhou Shigang community and the selected cases involved in the comprehensive evaluation, to obtain its completeness of the comprehensive score, and under the comparison of the design of the Community renewal to focus on the aspects of the comparison.

#### (5) Field Research Method and Questionnaire Method

In the research process of this paper, the field research method was selected to be used in combination with the questionnaire survey method to ensure the breadth and representativeness of the research data. Through field research in the old communities within the main study, and in-depth examination of the community, using visits, filming, interviews and questionnaires, etc., to collect the basic data of the case community, covering the use of the status quo, the attitudes of the residents, the needs and feedback, etc.. Through multi-dimensional research tools, the actual situation of the community is fully understood, providing real and reliable first-hand information for the study. This process not only provides sufficient basic materials for the subsequent analysis, but also ensures the objectivity and authenticity of the study, thus providing solid data support for the conclusions and recommendations of the thesis.

## 1.5 Research Framework

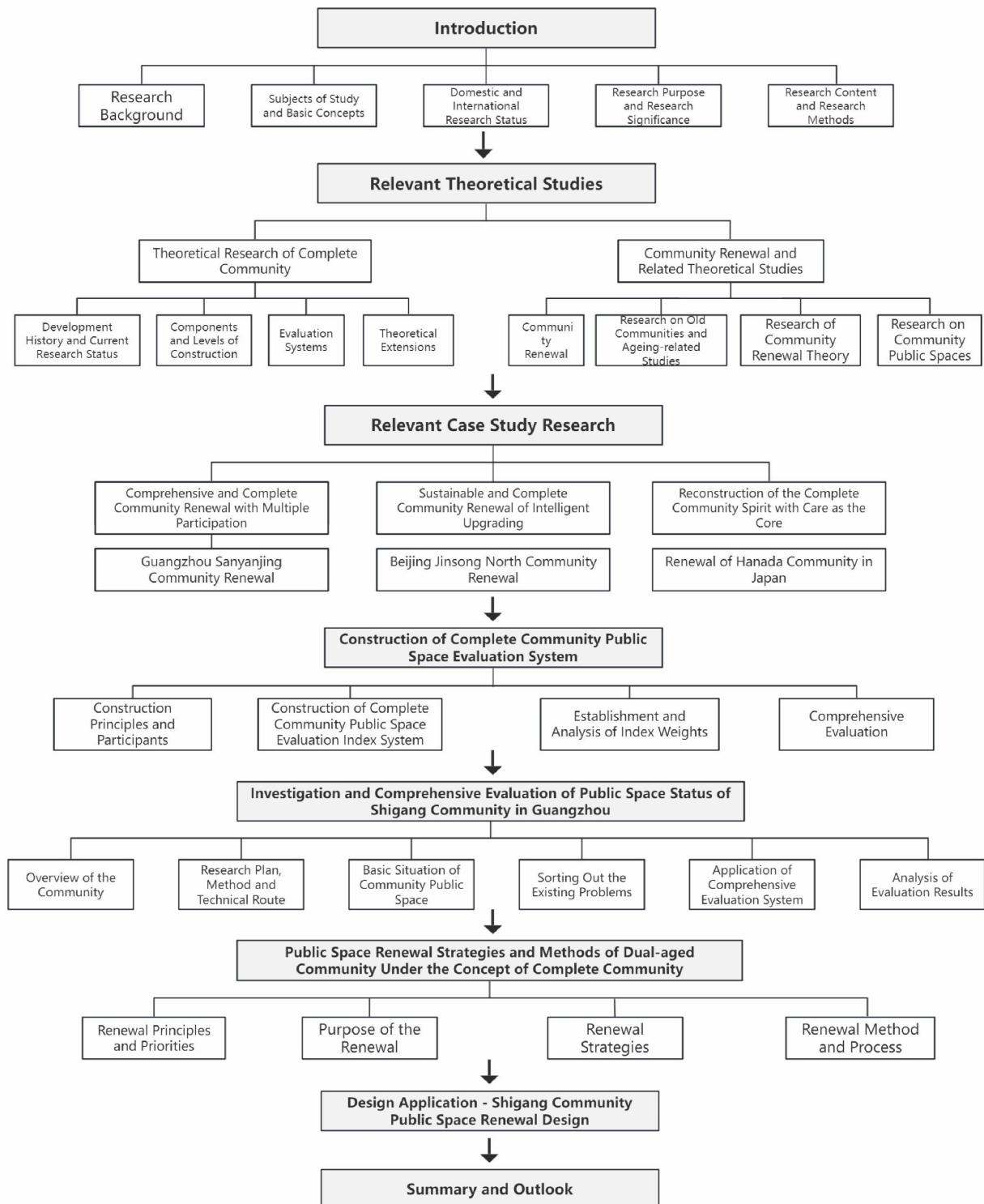


Figure 1- 3 Research Framework Diagram

(Source: author's drawing)

## 1.6 Summary of this Chapter

This chapter, as the introductory part of the whole text, systematically elaborates the necessity and logical foundation of the study from the aspects of research background, theoretical framework, and research path, and lays down the theoretical support and practical orientation for the development of the subsequent chapters.

The first part is based on the background of the transformation of China's urban development mode from incremental expansion to stock renewal, and combines the challenges of the aging society to make clear the urgency of the public space renewal of Dual-aged communities, i.e., it is difficult to meet the needs of elderly residents for ageing-friendly facilities and facilities with the traditional “top-down” renewal mode. That is, the traditional “top-down” renewal model is difficult to meet the diversified needs of elderly residents for ageing facilities, cultural remodeling and community governance, and the concept of complete community provides a theoretical breakthrough for cracking this dilemma, and on top of its theoretical framework, the author supplements and establishes the concepts of “old community”, “Dual-aged community”, “complete community”, “old community” and “old community”. On top of its theoretical framework, the author establishes four core research theories and objects, namely, “Dual-aged community”, “Complete community” and “Community public space”, to reveal the core role of the concept of complete community in promoting the sustainable development of the Dual-aged community, and to provide the research with a background and problem. The second part is about the purpose and significance of the study.

In the second part, the purpose and significance of the study further clarifies the theoretical research and practical value of the study. The study aims to construct a scientific evaluation system by improving the theoretical research and case study analysis, propose targeted renewal strategies, and apply them to specific community renewal projects in order to promote the comprehensive renewal of public space in Dual-aged communities.

The third part of the research content, methodology and framework systematically plans the technical route of the research, adopting a multi-method research path combining



literature analysis, case summarization, hierarchical analysis, fuzzy comprehensive evaluation and field research to ensure the comprehensiveness of the research content and the scientificity of the methodology.

The introductory chapter builds the overall framework of the study through the logical chain of “problem identification - theory construction - method application”, which provides a clear route for the in-depth analysis of the subsequent chapters and clarifies the direction and focus of the study.

## Chapter 2 Community Renewal in the Complete Community Perspective

With the acceleration of urbanization and the aging of the population, the traditional Community renewal model can no longer meet the diversified needs of the elderly for physical space renovation, Spatial Aging Adaptability design, cultural kernel remodeling and transformation of the community governance model. In this context, the introduction of the Complete community concept is particularly important. This chapter aims to systematically explore the theoretical framework and case practice of Dual-aged community public space renewal under the concept of Complete community, so as to provide solid theoretical support and practical references for subsequent studies.

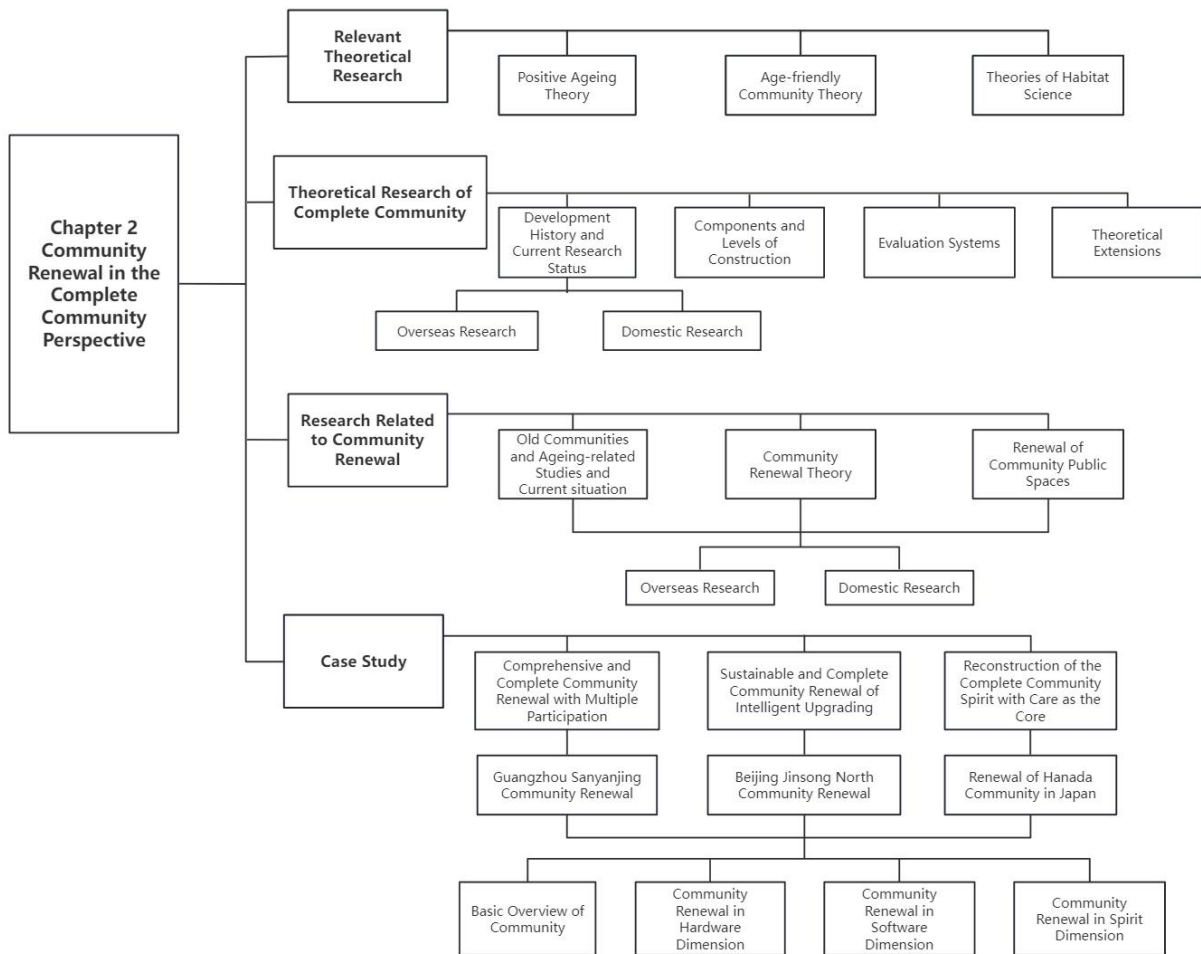


Figure 2- 1 Chapter II Chapter Structure Framework Chart

(Source: author's drawing)

The first part of the chapter is a theoretical overview, which systematizes the origin and

development of Complete community, its core connotation and its guiding significance to Dual-aged community renewal. Through the comparative analysis of Positive Aging Theory, Age-Friendly Community Theory and Habitat Science Theory, the core value of the Complete Community concept in terms of functional integration, cultural reshaping and service optimization is revealed; at the same time, through the synthesis and integration of the theory and practice of domestic and international community renewal, as well as the synthesis and integration of the research on the community's public space and aging-friendly research, the comprehensive analysis of the research object and the path of implementation is perfected.

The second part is the case study, which selects three typical cases, namely, Three Eyes Well Community in Guangzhou, Jinsong North Community in Beijing, and Hanahata Community in Japan, and analyzes them from the corresponding dimensions of the Complete community concept, such as the mechanism of pluralistic participation, the upgrading of Intelligence Services, and the reshaping of Humanistic Spirit. The analysis reveals the adaptability of the Complete community concept in different geographical and cultural contexts, and verifies its practical feasibility in solving the core problems of Dual-aged communities.

## 2.1 Relevant Theoretical Research

### 2.1.1 Positive Ageing Theory

Since the 1980s, the problem of global population ageing has become increasingly serious, triggering widespread concern and response from the international community. In order to respond to this challenge, countries have conducted in-depth discussions and continuous innovations in theoretical research and policy formulation in order to seek effective solutions.

The World Health Assembly, held in 1987, made “determinants of healthy aging” the main topic of its aging research program, and constructed a relevant theoretical system based on the health needs of the elderly themselves rather than on the perspective of social rights<sup>[17]</sup>. To a certain extent, the theory of healthy ageing has positive social implications for

maintaining the basic health and improving the quality of life of the elderly population. However, two negative views are implicit in this theory. First, it tends to view the elderly as a burden to society rather than a valuable asset to society. Second, it focuses more on the needs of older people rather than looking at the health of the older population from a social rights perspective. These two perspectives may lead to a neglect of the social roles and rights of older persons, thus affecting their social status and the overall improvement of their quality of life.

In the late 1990s, international scholars proposed the concept and theory of “active ageing” based on the theory of social rights. Compared with “healthy ageing”, “active ageing” is more comprehensive and generalized, focusing not only on the health status of older persons, but also emphasizing their active participation in society and the protection of their rights. The introduction of this new concept marks the expansion of the study of ageing from a purely health perspective to a broader social and rights perspective, and promotes the concern for the overall well-being of older persons and the formulation of corresponding policies. The core of the concept of “active ageing” lies in encouraging older persons to maintain positive attitudes and behaviors, including health maintenance, lifelong learning, social participation and volunteerism, in order to enhance the quality of life of older persons and promote their social contributions in the context of global population ageing. This theory not only considers older persons as beneficiaries of society, but also emphasizes their role as active participants and contributors to society. Thus, the theory of active ageing promotes a shift from pure health care to a more comprehensive perspective of social participation and empowerment, providing new ideas and directions for the development of an ageing society and the formulation of welfare policies for older persons.

Table 2- 1 Comparison of the Contents of “Traditional Aging”, “Healthy Aging” and “Active Aging”

<b>Distinctions</b>	<b>Traditional Ageing</b>	<b>Healthy Ageing</b>	<b>Positive Ageing</b>
Definitional Properties	Ageing of the population	Healthy state, physical and psychological ageing	Ageing in social relationships
Target Focus	Mainly concerned with the socio-economic challenges brought by ageing	Improve the quality of life and health for the elderly, reduce diseases and disabilities, enhance social adaptability	Promote social integration and continuous

Distinctions	Traditional Ageing	Healthy Ageing	Positive Ageing
			contribution of the elderly
Measure Oriented	Focuses on pension systems, healthcare reforms, etc	Provides better medical services, health education, and prevention plans	Supports employment opportunities, volunteer services, community participation for the elderly
Social Roles	The elderly are often seen as objects needing care	Encourages the elderly to remain active and independent	Emphasizes the role of the elderly as social resources, encourages active participation in social activities
Maslow's Hierarchy of Needs	Less focus on the personal development of the elderly	Encourages maintaining personal abilities and health	Values lifelong learning and personal growth for the elderly

(Source: compiled by the author based on relevant information)

As a multi-dimensional thinking and approach, the emphasis on the social participation and identity of the elderly helps the elderly to maintain an optimistic and positive mindset in self-realization and development, and prevents the urban elderly population from becoming neglected “urban prisoners”, which is a strong reference and guidance for the renewal of Dual-aged communities in cities. Such a theoretical framework has a strong reference and guidance significance for the renewal of urban dual-elderly communities. Dual-aged community in urban unit system as a witness of urban development, in which the elderly residents are also participants of urban development, in the relevant renewal activities should pay attention to the public space and other material carriers for the promotion and protection of the social activities of the elderly, so that the elderly in the public space of the community can be truly “active, nourishing, medical, education, and fun for the elderly”. The elderly in the community public space can really “the old have something to do, the old have care, the old have medical care, the old have learning, the old have education, the old have fun”<sup>[18]</sup>.

### 2.1.2 Age-friendly Community Theory

The concept of age-friendly communities originated from the Age-Friendly Cities Program published by the United Nations at the 18th World Gerontological Society

Conference in 2005<sup>[18]</sup>, which aims to respond to the new challenges to community development arising from the continuous growth of the elderly population, the urgent demand of the elderly for diversified and practical community resources and related facilities, and the application of the “aging in place” model. The aim is to respond to the urgent needs of the elderly for diversified and practical community resources and facilities as the population continues to grow, as well as the new challenges to community development arising from the application of the “ageing in place” model. At present, due to the differences in the specific conditions of each country, the specific content framework of “age-friendly community” has not yet formed a unified view and definition in the world, and the World Health Organization divides the content of “age-friendly” into eight aspects: transportation, housing, outdoor space and architecture, community support, and community support. The World Health Organization (WHO) categorizes “age-friendly” elements into eight areas: transportation, housing, outdoor space and architecture, community support and health services, communication and information, social participation, respect and social inclusion, public participation and employment<sup>[19]</sup>. Among them, transportation, housing, outdoor space and architecture are important components of the physical spatial environment, directly affecting older people's behaviors such as residence, travel and leisure; respect and social inclusion, social participation, public participation and employment belong to the aspects of the social environment and relationships, reflecting the social relationships between older people and other community residents and their ways to participate in social activities and employment; communication and Information accessibility reflects the efficiency of information dissemination between the community and local government as well as issues such as management mechanisms; community support and health care services refer to the provision of services for the elderly in terms of life care, medical care, education and recreation<sup>[20]</sup>.

From a comprehensive point of view, the meaning of “age-friendly community” can be defined as a type of community that aims to meet the special needs of the elderly group in terms of housing, health and social participation, and to provide a safe, comfortable, beautiful and harmonious living supportive environment, which not only creates conditions for the

elderly to spend their twilight years, but also provides supportive facilities and services, including living, medical care, education, culture, recreation and sports, etc. The community should be able to meet the special needs of the elderly group in terms of housing, health and social participation, It not only creates conditions for the elderly to spend their twilight years comfortably, but also provides supportive facilities and services including living, medical care, education, culture, recreation and sports. In the community, older people are both the subjects of the community and the objects of their residential living environments, the core of which lies in the promotion of harmonious coexistence and friendly interactions between older people and the residential living environments of the community<sup>[21]</sup>. In the past few decades, as aging has become a global problem, the concept of age-friendly community has also been reflected in some community renewal and construction in foreign countries, such as the United States and the early 21st century to promote the construction of healthy community projects for active aging Livable Community (Livable Community) and Healthy Community (Healthy Community) concept <sup>[22]</sup>. For example, the concept of Livable Community and Healthy Community proposed by the United States in the early 21st century to promote the construction of healthy communities for active aging<sup>[22]</sup>, and the concepts of Lifetime Homes and Lifetime Neighborhoods advocated by the United Kingdom to enhance community services and improve the living environment for the elderly.

As a supplement to the theory of “active aging” in the practical stage of the project, the concept of “age-friendly community” is very much in line with the concepts of hardware and software classification in the theory of Complete community, as it pays attention to the needs, spirituality, and social relations of the elderly. Its focus on the needs, spirituality and social relations of the elderly is in line with the concept of hardware and software in the theory of complete community, and the emphasis and importance of “Age-Friendly Community” on the public space of the community also provides a multi-dimensional guidance on the renewal of the public space, such as the living environment, behavioral interactions, service facilities, and other dimensions.

### 2.1.3 Theories of Habitat Science

In 2001, the publication of the book “Introduction to Habitat Science”, Mr. Wu Liangyong “Habitat” is described as a closely related to human survival activities on the surface space, it is human survival in nature, and the use and transformation of nature's main place<sup>[23]</sup>, that is, human life, housing, socialization, leisure and other activities take place in the place. From the perspective of discipline development, the theory of habitat science is a discipline that studies the environmental quality and spatial quality of places where human beings live and live, and its research is closely related to people's daily life and has strong practical significance.

Mr. Wu Liangyong divided the components of the human habitat into five main systems: the human system, the social system, the residential system, the support system and the natural system. Among them, the human system refers to the individual members of the settlement; social system includes public management, cultural characteristics and other links between people; residential system includes residential and community facilities; support system covers a variety of support systems to provide security for human activities; natural system refers to the overall natural environment and ecological environment. These five systems are interconnected and complementary, and together they form the complex structure of the human environment. Similar to the concept of Complete community, the theoretical framework of Habitat Science emphasizes the comprehensive examination and consideration of the spatial environment from a multi-dimensional and composite perspective, which is conducive to the renewal and quality enhancement of the public space of the Dual-aged community.

## 2.2 Theoretical Research of Complete Community

### 2.2.1 Development History and Current Research Status

#### 2.2.1.1 Overseas Development History and Research

##### (1) Conceptual Discrimination

As an important concept in urban planning and community development, “Complete community” has received extensive attention from scholars at home and abroad in recent



years. Through relevant searches and summarization, the author has developed that in the English literature, the terms corresponding to “Complete community” mainly include “Complete Community”, “Communities”, “Integrated Community” and “Integrated Development”. Communities”, ‘Integrated Community’ and ‘Integrated Communities’. Through Google Scholar and Web of Science and other authoritative databases, the above keywords were systematically searched and compared to further clarify the hotspots and directions of related research fields.

When using the terms “Integrated Community” and “Integrated Communities” in the literature search, the author found that relevant studies focused on the concept of “Integrated Community”. Integrated Communities”, such as Integrated Community Sustainability Planning (ICSP), Integrated Community Energy System (ICES) and so on. Although these studies are related to communities, their focus is mainly on a specific area of the community, such as healthcare, energy, or sustainable development<sup>[25]</sup>, which is significantly different from the concept of “Complete community” explored in this paper. Therefore, these keywords are not fully applicable to the scope of this study.

In contrast, related literature with the keywords “Complete Community” and “Complete Communities” are usually used to describe an idealized community model, emphasizing the functional completeness of the community in terms of residence, employment, education, healthcare, entertainment, etc., which is more in line with the concept of “Complete Community” in the context of this paper, Employment, education, medical care, entertainment and other aspects of the functional completeness of the community, which is more consistent with the concept of “Complete Community” in the context of this paper, so this paper adopts the concept of “Complete Community” to study the complete community in foreign countries. Therefore, this paper adopts the concept of “Complete Community” to study foreign complete communities.

## (2) Development History of Complete Community Research in Foreign Countries

In the previous theoretical comprehension of the history of Community renewal construction in foreign countries, the author summarizes the development history of modern

community construction in foreign countries into three stages, of which the third stage is the stage of focusing on the living environment for human beings starting from the end of the 20th century, and the ideas related to Complete community in foreign countries are also gradually perfected starting from this stage. Initially, the concept was used to cope with the rapid and disorderly expansion of cities in Europe and the United States after the Second World War, resulting in a series of unfavorable factors such as urban traffic congestion, lack of services and facilities, rising housing prices, little open space, loss of a sense of community, and environmental pollution, which led to a large number of middle-class-oriented population moved to the suburbs, resulting in the decline of urban centers and communities. In the 1990s, the new development models such as In the 1990s, new development models such as “New Urban Planning”, “New Urbanism”, and “Complete Community” were proposed as solutions to the imbalance of traditional community development<sup>[26]</sup>.

For example, New Urbanism advocates the construction of diverse, walkable, compact, efficient and vibrant mixed-function communities, and promotes the creation and revitalization of communities through comprehensive planning means, ultimately forming a fully functional community form<sup>[27]</sup>, and Complete Community as a comprehensive community development model, its core concepts and the principles of the New Urbanism have a high degree of compatibility. At the same time, the development of Complete community is also deeply integrated with the concepts of intelligent growth and sustainable development, reflecting the synergistic development trend of multi-dimensional and multi-objective in modern urban planning, which also provides a broad development space for its practical application.

### (3) Complete Community Renewal Practices Related to Foreign Countries

Through the combing of relevant information, the author found that the construction practice of Complete community abroad mainly focuses on the construction of urban communities in North America. For example, the city of Austin, Texas in the United States in 2012, in order to cope with the challenges brought by rapid urbanization in recent years, including housing shortages, traffic congestion, environmental pressure and insufficient

community services and other issues to plan the relevant construction. The Austin Plan proposes a renewal strategy centered on “inclusive growth” and “sustainable development,” which aims to optimize the spatial layout of the city, enhance community services, promote green and low-carbon development, and strengthen community cohesion through comprehensive planning and construction. It includes seven objectives: livability, sustainability, creativity, education level, prosperity, accessibility and humanity, and the corresponding construction modules cover seven aspects: land use and transportation, housing and neighborhood, community economy, environmental protection, service facilities, community environment and creativity<sup>[28]</sup>.

The core elements of the Community renewal strategy include optimizing the spatial layout of the city, improving the efficiency of land use and reducing urban sprawl; upgrading the service capacity of the community by building multi-functional community centers and integrating educational, medical, commercial and other service facilities, so as to ensure that the residents can satisfy their daily needs within a walking distance; promoting green and low-carbon development by vigorously promoting the application of green buildings and renewable energy, and promoting sustainable development of the community through measures such as the slow-moving system and garbage sorting; and enhancing community cohesion and encouraging residents to participate in community affairs. It will also promote green and low-carbon development, vigorously promote the application of green buildings and renewable energy, and promote sustainable community development through measures such as slow-moving transportation systems and waste separation; and enhance community cohesion and encourage residents to participate in community affairs. The path of implementation includes policy support and multi-party cooperation, as well as the construction of an innovative ecosystem.

Table 2- 2 Summary of Austin's Renewal Strategy

Strategy Dimension	Specific Measures			Construction Purpose			Implementation Pathways
<b>Spatial Layout Optimization</b>	Compact construction	city of innovation areas	design, sci-tech	Improve efficiency, work-life balance	land use achieve		Improve land use efficiency, achieve

Strategy Dimension	Specific Measures	Construction Purpose	Implementation Pathways
			work-life balance
<b>Community Service Improvement</b>	Multi-functional community centers, integration of public service facilities	Meet diverse needs of residents	Community participation, cultural construction
<b>Green Low-Carbon Development</b>	Green buildings, use of renewable energy, slow traffic systems	Reduce carbon emissions, promote sustainable development	Build innovative ecological systems
<b>Transportation Infrastructure</b>	Light rail projects, intelligent transportation systems	Alleviate traffic congestion, improve traffic efficiency	Cooperation between government and private sectors

(Source: compiled by the author based on relevant information)

In 2017, Toronto planned a new Complete community on the southeast waterfront of downtown to promote economic development, job creation, housing, and sustainable and environmentally friendly urban development through a comprehensive strategy with clear strategies and evaluation metrics for each of the goals to ensure that the renewal objectives are met and to promote new modes of transportation and urban innovation.

Table 2- 3 Summary of Toronto's Complete Community Renewal Strategy

Strategy Dimension	Specific Measures	Construction Objectives	Implementation Pathways
<b>Economic Development and Employment</b>	Build sci-tech innovation zones, provide industrial support policies	Promote economic growth, create job opportunities	Attract high-tech enterprises, attract high-quality talent
<b>Affordable Housing</b>	Promote mixed-use development, increase the proportion of low-income housing	Ensure that different income groups can afford housing	Provide housing subsidies, optimize housing structure
<b>Sustainable Development</b>	Promote green buildings, implement energy-saving and environmental protection designs	Reduce carbon emissions, promote environmental protection urban development	Promote waste classification, resource recycling
<b>New Transportation Modes</b>	Build light rail projects, optimize walking and cycling networks	Improve transportation infrastructure, promote public transportation	Build light rail, optimize slow traffic systems
<b>Urban Innovation Construction</b>	Build physical and virtual data platforms	Use data and technology to support community construction and management	Monitor community operations through sensors and internet technology

(Source: compiled by the author based on relevant information)

### 2.2.1.2 Domestic Development History and Research

#### (1) The Development of Complete Community Research in China

The concept of “Complete community” (Integrated Community) referred to in this paper comes from the latest Guidelines for the Construction of Complete Residential Communities issued by the Ministry of Housing and Construction. It was first proposed by Mr. Wu Liangyong at the 2010 World Expo, emphasizing that talent is the core of the city and community is the most basic place for human life<sup>[29]</sup>. The construction of Complete community should contain three main dimensions, hardware dimension: i.e., basic public service facilities, complete commercial service facilities and municipal supporting facilities, and public space for residents' activities, etc.; software dimension: professional property management and long-term sound community management mechanism, etc.; spiritual dimension: there should be a common sense of community, community culture, and strong sense of identity among residents. Such a level of construction fits well with the renewal needs of the Dual-aged community under study in this paper, and has a considerable degree of application value. At present, after more than ten years of theoretical research and development, the number of relevant studies on Complete community in China has been more than sufficient, therefore, this paper summarizes the relevant literature by combing and summarizing the perspectives of the research, and summarizes the spatial and non-spatial respectively.

Spatial research first focuses on the reconstruction and optimization of physical space, focusing on the planning and design of the community's physical environment and emphasizing the enhancement of community functional integrity through spatial reconstruction. Chen, Lintong, and Huang, Duo (2021) proposed that “spatial integrity” covers land use, building form and public space layout, and together with the four aspects of facility integrity, cultural integrity and governance integrity, they constitute the “integrity” of Complete community. Wu Xuesong (2021) further refined Complete community into eight dimensions, including land use, spatial form, public facilities, and governance level, emphasizing the composite function of community as a social service unit<sup>[30]</sup>. At the

implementation level, Chen Qiu et al. (2020) take Jiaxing Guiyuan District as an example to achieve functional enhancement of the old community through the addition of public space and optimization of facility layout<sup>[32]</sup>. Huang Xiao (2021) proposed a design strategy to reshape the vitality of the community and emphasized on spatial accessibility and functional diversity in response to the public space problem in Xin Gui Dong district<sup>[33]</sup>.

Secondly, the research about the spatiality of Complete community also includes the layout of facilities with for the analysis of spatial network. Yang Yonglan, Sun Congyi, Tu Zhengwei et al. (2023) assessed the current situation of complete community construction in Wuhan based on the Standard for Complete Community (Trial), using Arcgis spatial network and hierarchical analysis, found insufficient coverage of facilities and spatial differentiation, and proposed to optimize the spatial structure at three levels, namely, microscopic (facility layout), mesoscopic (community network), and macroscopic (policy synergism)<sup>[34]</sup>. Tian Yufeng (2021) explored the influencing factors of public space in youth apartment communities, proposed the principle of spatial design based on behavioral needs, and emphasized the interactivity between space and residents' activities<sup>[35]</sup>.

Non-spatial research mainly focuses on the exploration of community governance mechanisms and cultural identity, i.e., the embodiment of software dimensions within the framework of Complete community, of which the community governance part focuses on the governance mechanism and the role of the residents' main body. Li Shun (2012) proposed the “five common” construction method (common planning, common construction, common management, common evaluation, and sharing) through the Community renewal construction in Yunfu, emphasizing the improvement of the Community governance system through the participation of residents<sup>[36]</sup>. Wu and Wang (2020) pointed out that the construction of Complete community needs to build a social and public participation platform, and improve the level of governance refinement through digital means<sup>[37]</sup>. At the implementation level, Wang Guimei (2021) realized the combination of “hardware renewal” and “governance empowerment” through the introduction of the residents' deliberation mechanism and intelligent security system. Meanwhile, Chengdu and Nanjing explore the models of

“community social enterprise” and “community builder” to enhance the capacity of community self-governance by leveraging the participation of residents through professionalization.

Second, cultural integrity is also an important dimension of non-spatiality research. Chen Lintong and Huang Duo (2021) incorporated cultural integrity into the theoretical framework of Complete community, emphasizing the importance of community cultural identity and historical heritage<sup>[30]</sup>. Tian Yufeng (2021) explored the cultural attributes of public spaces in youth apartment communities and proposed to enhance the sense of community belonging through cultural activities and spatial design<sup>[35]</sup>.

By combing and summarizing the spatial and non-spatial studies of Complete community, the author believes that there is also a trend of mutual integration between spatial and non-spatial studies, i.e., the dimensions of the construction of Complete community are interpenetrating each other, constituting an organic theoretical system. Complete community construction needs to realize the synergistic development of physical space and social network, such as Wang Mingzhu (2022) proposed a dynamic evaluation system based on big data, through the digital platform to achieve the effectiveness of community service monitoring and consolidation of the effectiveness of the renewal, and to promote the deep integration of spatial optimization and the improvement of governance capacity, especially in large-scale urban communities need to focus on the construction of fine-grained governance and digital platforms<sup>[39]</sup>. At the same time, technological innovation can also be combined with the governance model, such as Tongji University's “NICE2035 Future Life Prototype Street” project will be embedded in the innovation laboratory in the old community, to promote the “sense of the future” and “smoke and fire” integration, exploring the community as the “future” and “smoke and fire” integration. The project promotes the integration of “futuristic” and “smoke and fire”, and explores the possibility of the community as a source of urban innovation.

Currently, research related to Complete communities is moving from the hardware and software dimensions to further strengthening the synergy between spatial optimization and

governance capacity enhancement, exploring differentiated development paths, and thus realizing the community vision of “livability, vitality and good governance”. At the same time, the combination of spatial and non-spatial research will also provide new research perspectives and practical paths for Complete community building, further integrating multidisciplinary perspectives.

## (2) Domestic Practices Related to Complete Community

Complete communities, as an important vehicle for enhancing residents' quality of life and sense of well-being, have gradually been emphasized in China's urban construction in recent years. Since the concept was put forward in 2010, Complete community has gone through an exploratory process from local practice to national recognition, and has gradually formed an implementation path focusing on intelligent, all-age friendly and sustainable development to enhance residents' quality of life and sense of well-being and promote the modernization of urban governance. This chapter aims to sort out the development history of Complete community research in China, analyze its theoretical and practical achievements, and explore future research directions. By combing the relevant literature and policies, the author divides the relevant stages of practical development in China regarding the concept of Complete community into two intervals.

The first is the period from 2010 to 2019, when the concept of the Complete community has been put forward and has been practiced at the local level. For example, in 2012, Fujian Province took the lead in practicing the construction of Complete communities by issuing the Guidelines on the Implementation of the “Point, Line and Surface” Plan for Comprehensive Improvement of Urban and Rural Environments, which put forward the construction standards of “six have, five meet, and three perfect”. Among them, “six” includes comprehensive service stations, kindergartens, bus stops, public activity areas, municipal facilities and slow-moving systems; “five” involves appearance improvement, parks and green spaces, road construction, municipal management and environmental sanitation; The “Three Improvements” emphasize the improvement of organizational teams, community services and co-construction mechanisms. The practice of Fujian Province has provided an



important reference for the construction of complete communities across the country, and a number of typical community cases have emerged, such as the “common building” initiatives in Yunfu and Xiamen, which have significantly improved the community environment and the quality of life of residents. On the basis of Fujian's experience, Guangzhou City has proposed an upgraded version of the standard of “six, five, three, one”, which provides a new way of thinking for the transformation of old neighborhoods. Among them, “six have” includes a comprehensive service station, a kindergarten, a bus stop, a public activity area, a set of perfect municipal facilities and a set of convenient slow-moving system; while “five meet the standard” requires that the appearance of rectification, parks and green spaces, road construction, municipal management and environmental sanitation meet the standard. The “five standards” require that the appearance improvement, park green space, road construction, municipal management and environmental sanitation meet the standard requirements. In addition, “Three Perfections” refers to the improvement of the organizational team, the improvement of community services and the improvement of the co-construction mechanism; and “One Convention” refers to the formation of a community residents' convention that is observed by the community residents.

The second is that since 2020, as the theme of Community renewal under the concept of Complete community has attracted great attention from the central government, its practical research has thus entered a stage of comprehensive exploration. In 2020, the construction of Complete community was incorporated into the national policy level. The Ministry of Housing and Construction (MOH&C) issued the Guiding Opinions on Comprehensively Promoting the Renovation of Old Urban Neighborhoods and the Opinions on Carrying Out Short-Cutting Actions for the Construction of Urban Residential Communities, which clarified the importance of Complete Communities as a basic unit of life, and put forward specific standards and guidelines for their construction.2022, the MOH&C and the Ministry of Civil Affairs (MOCA) jointly issued the Circular on the Pilot Work on the Construction of Complete Communities to further promote localities to carry out pilot work and continue to promote research related to exploring the construction of Complete communities<sup>[38]</sup>.

Table 2- 4 List of Policies and Documents Related to Complete Community

Policy	Issuing Authority	Issuance Date	Main Content
"Opinions on Carrying Out Urban Residential Community Construction and Improvement Pilot Projects"	Ministry of Housing and Urban-Rural Development and 12 other departments jointly issued	August 2020	Clearly defines the complete community as a basic unit for people's daily life, providing basic public services and facilities. It is also a basic unit for community governance. By building complete communities, improve service facilities, create a livable community environment, reflect community culture, and promote the establishment of a community governance system based on joint construction and sharing.
"Trial Standards for Complete Residential Community Construction"	Ministry of Housing and Urban-Rural Development and 12 other departments jointly issued	August 2020	Clarifies the construction goals, main content, and specific requirements of complete residential communities, providing a standard basis for the construction of complete communities across various regions.
"Guidelines for Complete Residential Community Construction"	Office of the Ministry of Housing and Urban-Rural Development	December 2021	Explains the basic connotation of complete residential communities, clarifies the basic requirements for their construction, and proposes six major aspects of construction guidance including basic public services, commercial services, municipal supporting facilities, public activity spaces, property and community management.
"Notice on Carrying Out Pilot Work for Complete Community Construction"	Ministry of Housing and Urban-Rural Development and Ministry of Civil Affairs jointly issued	October 2022	Focuses on the "one old, one young" facilities that are closely related to the public, and improves community service facilities. It aims to create a livable environment, promote intelligent services, and carry out a two-year pilot in four major aspects including community management and governance. It aims to build a batch of safe, healthy, well-equipped, and well-managed complete community models.
"Guidance on the Implementation of the Rural Environmental Sanitation Comprehensive Improvement 'Three-Year Action Plan'"	Fujian Provincial Government	2012	Proposes the "six complete, five complete, three complete" standards for the construction of complete communities, including comprehensive service stations, kindergartens, public transportation stations, public activity areas, municipal facilities, and slow traffic systems, as well as landscape, park greening, road construction, municipal management, and environmental sanitation software services.
"Implementation Plan for Complete Residential Community Construction"	Wuhan Municipal Government	2022	Based on the "Trial Standards for Complete Residential Community Construction", explores the current status of complete community construction in Wuhan, and uses ArcGIS spatial network analysis and other methods to comprehensively evaluate the coverage and completeness of the community construction index, and proposes specific construction countermeasures.
"Implementation	Hangzhou	2021	Based on the current situation of old urban

Policy	Issuing Authority	Issuance Date	Main Content
Plan for the Reconstruction and Complete Community Construction of Old Urban Residential Areas"	Municipal Government		residential areas, it constructs the elements of a complete residential community, elaborates on the relationship between the reconstruction of old urban residential areas and the construction of complete residential communities, and uses the reconstruction of Desheng New Village as an example to specifically describe the construction practice of complete residential communities.

(Source: compiled by the author based on relevant information)

### 2.2.2 Components and Levels of Construction

Through the author's spatial and non-spatial classification of Complete Community development and research, corresponding to the hardware and software dimensions of Complete Community emphasized in the current study, the composition of China's Complete Community can be summarized as having the following six characteristics: ① focusing on the “hardware” construction, as well as The “software” construction; ② can identify the shortcomings of community construction; ③ pay attention to children, the elderly, the disabled and other special groups; ④ respond to the needs of residents' new life; ⑤ pay attention to meet the basic needs of the residents; ⑥ emphasize the role of the main body of the residents<sup>[40]</sup>. Combining the current situation and objectives of Dual-aged community renewal in this paper, the author summarizes the corresponding constituent elements of Complete community in this paper into three major dimensions: hardware dimension, software dimension and spiritual dimension.

The hardware dimension focuses on the material foundation of the community, including comprehensive basic public service facilities, municipal support facilities, and public activity space, etc., in order to meet the daily life needs of the residents; the software dimension focuses on the management and services of the community, such as professional property management, intelligent community construction, and community governance mechanisms, etc., in order to enhance the operational efficiency of the community and the convenience of the residents; and the spiritual dimension focuses on the community's cultural connotation and spiritual dimension focuses on the cultural connotation of the community and the spiritual needs of the residents, including the shaping of community culture, the promotion of

neighborhood relations, and the retention of place memory, in order to enhance the residents' sense of belonging and community cohesion. These three dimensions are mutually supportive and integrated, and together they form the overall framework of a Complete community, providing residents with a high quality living space that is functional, well-managed and culturally rich.

Meanwhile, through the research on the theory and construction of Complete community in foreign countries, it is found that compared with China's construction strategy focusing on the design of community renovation and renewal, and the summary of practical experience, the relevant construction in foreign countries mainly focuses on the aspects of housing, service and function, culture, and intensive construction, that is, it mainly focuses on the aspects of continuous operation and upgrading and renewal of the community. For example, the City of Winnipeg in the U.S. launched the Complete Community 2.0 Charter in 2011, which combines the planning background of Winnipeg and a number of guiding documents to build a systematic framework for the future development of the city. Specifically, the document sets clear development goals, principles and policies for different areas, details specific actions the city can take, and establishes a set of evaluation criteria that prioritizes infrastructure planning in areas with the greatest potential for Complete communities. Dynamic monitoring of the supply of residential and employment land ensures that planning policies are flexible and responsive to the changes and challenges of urban development, thereby enhancing the adaptability and sustainability of planning.

In terms of services and functions, Kristin Lenore Donaldson (2019) delves into the core goals of Complete communities, namely, achieving self-sufficiency and sustainable development, from the perspective of the diversity of community functions. A two-part assessment matrix was constructed based on Austin-area sustainability indicators, and a systematic comparative analysis of three typical cases was conducted through empirical research methods. The study reveals the common characteristics of Complete communities in terms of functions and services, and further proposes that the communities should enhance their sustainability by optimizing the service supply, while providing data support and

decision-making basis for urban planning in a wider context, which provides an important reference value for the theoretical construction and practical application of Complete communities<sup>[41]</sup>.

As for the level of humanistic construction, Jammy Lynne Bennett (1961) takes Hollywood theaters as an example, explores the role of movie theaters as a key cultural resource in building Complete Communities and its contribution, and analyzes other factors affecting the achievement of the goal of Complete Communities<sup>[42]</sup>; and Harsha Munasinghe (2007) critically studies the impacts of integration of cultural sector and urban development integration on the construction of Complete communities in developed cities, pointing out that the integration of culture and urban space can enhance the city's ability to build Complete communities, as well as the role of rational cultural strategies and accurate interpretation of cultural connotations as important factors in promoting the construction of Complete communities<sup>[43]</sup>.

### 2.2.3 Evaluation Systems

At present, due to the concept of “Complete community” has only been developed for more than ten years, the related evaluation system is still relatively small, and the related research is also in the initial stage, for example, some scholars directly apply the existing construction standards to evaluate the research object, and put forward corresponding renewal strategies, while some scholars from the “Complete community” concept connotation of the initiative to build the evaluation index system. Some scholars have taken the initiative to construct an evaluation index system from the concept of “Complete community”.

Based on the concept of “Complete community” proposed by academician Wu Liangyong, Wu Xuesong (2021) constructed a complete community planning and construction indicator system through four steps of conceptual refinement, analysis and construction, indicator empowerment and indicator quantification by drawing on the four-part design method. The system includes two primary indicators, eight secondary indicators and 20 tertiary indicators for built environment (hardware) and community governance and services (software). The study not only clarifies the specific connotation of each indicator, but

also proposes the application prospect of this indicator system in community planning, construction and evaluation, which provides an important reference for subsequent studies<sup>[44]</sup>. Zhang Lemin and Zhang Ruoxi et al. (2022) constructed a community-level urban health check indicator system oriented to the goal of Complete community construction under the multi-level urban health check conduction system. The system is based on eight evaluation panels proposed by the Ministry of Housing and Construction (MOHURD), namely, ecological livability, health and comfort, safety and resilience, convenient transportation, landscape features, neatness and orderliness, diversity and inclusiveness, and innovation and vitality, and it contains 17 first-level indexes and 54 second-level indexes. Taking the practice of physical examination in Yingping Area, a typical old city neighborhood in Xiamen City, as an example, the study proposes Community renewal measures and governance countermeasures, which provides important reference for carrying out physical examination in China's cities in a refined way<sup>[45]</sup>.

In addition, some Community renewal evaluation systems for Complete communities have also appeared abroad in recent years, for example, Canada's "Complete Communities" planning framework creates a self-sufficient, livable and workable community environment through policy guidance and resource allocation. Meanwhile, some scholars have also adopted a multi-dimensional and multi-level approach to construct the evaluation index system. For example, American scholar Kristin Lenore Donaldson (2019) constructed a two-part evaluation matrix based on the Austin area sustainability indicators, revealed the common characteristics of Complete communities in terms of functions and services through empirical research, and put forward suggestions to enhance community sustainability through optimizing the supply of services<sup>[41]</sup>.

At the practical level, in 2021, Wuhan City constructed the "Community + Street" in the "Building a Livable Wuhan - Special Plan for the Construction of Complete Communities", based on the classification of Complete Communities, and from the six major aspects of residential needs, travel needs, living needs, leisure needs, security needs and management needs. "A two-level and multi-category indicator system of "basic + characteristics" has been

constructed in the Special Plan based on the classification of complete communities. At the Complete community level, there are 8 level 1 indicators + 25 level 2 indicators + N characteristic indicators, while at the Healthy Streets (15-minute living circle) level, there are 5 level 1 indicators + 13 level 2 indicators. The establishment of the indicator system not only takes into account the main body of implementation of community-level facilities, but also combines the actual needs of the local community, with strong operability and promotion value. As for the relevant areas in foreign countries, Singapore has also emphasized the importance of regular maintenance of community facilities and residents' participation in the repair and renovation mechanism of public HDB flats, which provides reference for the renovation of old communities in China. For example, its planning for community service facilities is based on the core concept of “checkerboard design and seamlessness”, emphasizing the convenience and accessibility of community public service facilities, exploring the model of “Neighborhood Centers”, promoting the participation of residents in the renewal mechanism of community governance, and summarizing the following The corresponding renewal indicator elements are summarized<sup>[46]</sup>.

## 2.2.4 Theoretical Extensions

Before the concept of “Complete community”, Wu Liangyong academician in his writings and ideas have shown similar thinking, such as in the early years of the theory of organic renewal. Academician Wu Liangyong that the city can be compared to an organic life form, its continuous development process is always in a metabolic state, the internal structure of the interrelated and follow certain laws of development. That is, the development of the city usually presents “development - renewal - redevelopment” cycle mode, when the development of a certain stage, the need for renewal to achieve functional optimization and enhancement<sup>[47]</sup>. In the renewal of Beijing Ju'er Hutong, the corresponding theoretical ideas have also been extended at the implementation level. As a key project of Beijing's old city renovation, although the focus of Juel Hutong's renewal is ultimately on the balance between the historical value of the neighborhood's architecture and the practicality of modern life, its focus on the old status quo and the elderly population is also similar to the current

construction goals of the elderly Complete Community renewal and the significance of the situation and reference.

The proposal and development of the concept of Complete community not only provides a new theoretical framework for urban planning and community construction, but also can be a new idea and method to solve many problems in the process of urbanization. With the development of social economy and the diversification of residents' needs, the Complete community concept should also be extended and expanded in practice to show its strong adaptability and foresight. By combining the similar extension theory with the current Complete community renewal goal, the continuous renewal and development of this theory in the future community renewal is ensured. Mr. Wu Liangyong emphasized that elements of historical value and cultural significance should be retained, while the obsolete part of the “insertion” renewal strategy, with the appropriate size and scale, combined with the content and objectives of the transformation, and properly deal with the relationship between the status quo and future development, so as to achieve the relative integrity of the district on the basis of the preservation of urban texture, environment, and so on. Organic renewal and other extended theories not only provide methodological support for current Urban Renewal, but also provide a scientific basis for balancing the contradictions in the process of conservation and renewal.

## 2.3 Research Related to Community Renewal

### 2.3.1 Domestic and Overseas Research and Current Status on Old Communities and Ageing-related Studies

#### 2.3.1.1 Current Status of Research Related to the Concept of Aging Community and Aging in Foreign Countries

Since the 1970s, a wave of old house renovation has emerged in Western countries. In the 1980s, investment in old house renovation continued to increase, reaching one-third to one-half of the total housing construction. By the 1990s, with the strong support of governments in various countries, old house renovation has gradually become an important part of the international construction industry. With the continuous deepening of research and



promotion of old house renovation, countries have formulated different renovation strategies based on their own conditions. These strategies and measures combine their own characteristics to form a renovation model that adapts to different national conditions. The ultimate goal is to provide citizens with a more comfortable and modern living environment. The main renewal strategies and contents of old house renovation abroad include the principles of preservation, small-scale repairs, and focusing on neighborhood reconstruction and community renewal. However, during this period, due to the inability to match the social development of the new era, the old concept of "large-scale demolition and reconstruction" gradually shifted to the concept of "sustainable development of residential areas"<sup>[48]</sup>. The core idea of the concept is to create richer, healthier and more livable environments.

Foreign countries started the practice of renewing old communities early and have accumulated rich experience and innovative models. Some of these strategies and methods are of reference significance for the renewal of old communities in my country. In Europe, the "Urban Acupuncture" strategy in Amsterdam, the Netherlands, effectively activated community vitality and improved residents' sense of happiness by implementing a series of small-scale, high-precision renovation projects in the community<sup>[49]</sup>(Moulaert et al., 2005). The "Community Land Trusts" model in London, UK, uses non-profit organizations to hold land, ensure housing affordability, and prevent the community from being eroded by commercialization<sup>[50]</sup>(Crawford, 2012). In the United States, the book *Human Places: A Guide to Urban Open Space Design* by Clare Cooper Marcus and Carolyn Francis discusses in detail the site planning, design principles and details of outdoor activity spaces in elderly residential areas, and proposes corresponding design guidelines based on the social and psychological needs of the elderly, aiming to create a more suitable outdoor activity environment for the elderly group<sup>[51]</sup>; In design practice, the Terraces nursing community in the United States is a typical example of upgrading and renovating elderly communities, demonstrating a professional and systematic elderly care system. This example has important reference value and guiding significance for the renovation of elderly communities in my country. In Asia, Japan, as a country with the strongest aging trend, has great reference significance for my

country in terms of theoretical innovation and practical experience in the renewal of old communities and aging-friendly design. As early as the 1950s, the social security policy for the elderly was clearly proposed. In 1968, Japan began to implement the "Silver Housing" plan, marking an important milestone in the development of the elderly care industry<sup>[52]</sup>. The development of Japan's elderly care industry is closely related to policies. The refinement and integration of policies provide legal support for the transformation of the living environment needs of the elderly.

In general, the relevant research trends abroad have started from multiple perspectives, such as community development positioning, specific renewal measures, social service system construction, rationalization of spatial layout, and improvement of living environment. The academic community has initially formed a systematic research system covering the entire process of community planning, community construction, and community governance. This system not only focuses on the optimization of the physical environment and the improvement of social services, but also emphasizes a comprehensive and sustainable community development strategy. In addition, the differentiated needs of the elderly at the physiological and psychological levels are gradually attracting widespread attention from the society. Through in-depth analysis of the daily life patterns, health conditions, and psychological needs of the elderly, researchers have put forward corresponding design principles and policy recommendations to ensure that the elderly can live in a comfortable and safe environment. By integrating multidisciplinary research results, relevant foreign research has provided a rich theoretical basis and practical guidance for the construction of elderly-friendly communities.

#### 2.3.1.2 The Correlation and Research Status of Old Communities and Aging-friendly Concepts in China

In recent years, with the gradual transformation of the times, the renewal of old communities and the research on their adaptation to the elderly have received unanimous attention from domestic scholars, reflecting the urgent need of society to improve the quality of the living environment for the elderly in the context of an aging population. In July 2020,

the Ministry of Housing and Urban-Rural Development issued the "Guiding Opinions on Comprehensively Promoting the Renovation of Old Urban Communities" in the hope of better solving the problems of old communities. Judging from the annual trend of the publication of relevant research, the adaptation of old communities to the elderly has ushered in a new climax of discussion in recent years. Research on its renovation mainly focuses on the content, countermeasures and practice of the renovation.

In the study on the design of public spaces in old communities for the elderly, Zhang Fan (2019) adopted the elderly ecology model to analyze the relative relationship between the community environment and the life pressure and individual strength of the elderly and its impact on the quality of life. The results of this study were used to guide the formulation of optimization suggestions for the core factors of the urban community environment for the elderly, and to propose improvement plans for the adaptation of urban communities to the elderly under the guidance of quality of life<sup>[53]</sup>. Zhao Jing (2019) explored the issue of living welfare for the elderly, analyzing it from the aspects of housing welfare policies, housing demand, elderly care facilities and living environment, combining the elderly care model with the planning of elderly care service facilities and living conditions, and expanding the perspective of elderly welfare research<sup>[54]</sup>.

In terms of renewal strategies, Cai Yunnan et al. (2017) pointed out that micro-renovation of old residential areas covers both "hardware" and "software" aspects. The "hardware" aspect includes the renovation of the main body of the house and the improvement of the public environment, while the "software" aspect focuses on creating harmonious neighborhood relations. Specific renovation themes include building renewal, energy-saving renovation, exterior and interior renovation, public facilities upgrade, infrastructure improvement, road traffic system optimization, landscape and green space renovation, establishment of community exchange platform, and cultivation of multiculturalism, totaling 14 projects<sup>[55]</sup>. When analyzing the main problems of old residential communities, Jiang Na (2016) proposed corresponding transformation strategies from the perspectives of institutions and citizens, arguing that public institutions should play an

important role in planning, organization, supervision, coordination and management, while citizens should give full play to the role of self-governance and form a management model that adapts to local conditions<sup>[56]</sup>. Gu Shaohua (2018) suggested promoting the revitalization of old communities by establishing five key mechanisms: first, establishing a financing mechanism shared by the government, owners and residents; second, establishing a coordination mechanism that combines government leadership with resident autonomy; third, simultaneously improving the level of technological innovation and environmental improvement in the neighborhoods; fourth, creating an innovative management mechanism for old neighborhoods; and fifth, promoting an urban planning and design coordination mechanism to support the redevelopment of old communities<sup>[57]</sup>.

To sum up, the aging-friendly renovation of old communities in China is gradually progressing, but it still faces many challenges. The practice of renewing old communities at home and abroad shows that successful community renewal requires multi-faceted considerations such as interdisciplinary cooperation, participation of multiple subjects, and respect for local culture.

## 2.3.2 Domestic and Overseas Research and Comparison of Community Renewal Theory

### 2.3.2.1 Theoretical Development and Research Status of Community Renewal in Foreign Countries

In 1929, Perry proposed the concept of "neighborhood unit", and other scholars subsequently continued to improve it. As governments of various countries have successively introduced safeguard policies to promote the community construction movement, foreign cities have gradually shifted from large-scale demolition and reconstruction to small-scale gradual urban renewal, and gradually focused on micro-communities. In the 1960s, European and American scholars reflected on the large-scale demolition and reconstruction urban renewal method. Western countries have continuously explored small-scale gradual urban renewal methods that are in line with human scale in theory and practice, marking the beginning of real urban renewal (Table 2-5). American sociologist Jane Jacobs proposed the idea of "small-scale gradual transformation" in her book *The Death and Life of Great*

American Cities<sup>[58]</sup>. She believes that large-scale urban transformation and reconstruction will lead to the self-destruction of urban diversity. At the community level, urban diversity must meet the needs of different functions and different groups of people. According to the different characteristics of cities, urban planners have proposed various new transformation methods and diversified planning theories. Correspondingly, the transformation of residential environment and landscape has also been developing and changing in line with the pace of urban renewal.

Table 2- 5 The Gradual Transformation of Western Urban Communities

Format	Specific Content
"Small-scale Incremental Renovation"	The "Community Development" program in the United States, the "Historical District Restoration" program in Europe, and various projects implemented in different countries such as "Selective Reuse of Old Buildings," "Community Building," and "Self-construction by Residents."
Related Theories and Practical Methods	Participatory planning by Janneke Voss, advocacy planning by David Harvey, continuous planning by Christopher Alexander, incremental planning by Johnson, public choice planning by John Nolon, and network planning by Jay Corbett, etc.

(Source: compiled by the author based on relevant information)

The development of community renewal abroad can be roughly divided into three stages. The first stage, from the end of World War II to the 1960s, was the period of formation of the global community development model; the second stage, from the 1970s to the early 1980s, was a period of community renewal that focused on historical and cultural protection and neighborhood interaction; the third stage, from the 1990s to the present, after a long period of exploration, the theoretical and practical research on community renewal abroad has gradually matured and entered a period of multi-dimensional community comprehensive revitalization with the concept of sustainable development as the core<sup>[59]</sup>. At the end of the 20th century, many foreign experts and scholars advocated the user-centered concept based on actual conditions and began to pay attention to the human scale and needs in the outdoor environment, providing theoretical basis and empirical support for effective transformation (Table 2-6). They believe that people are an indispensable part of the living environment, emphasize the coordinated relationship between people's lives and the outdoor environment, pursue the integration of diversified lifestyles and multi-level material spaces, attach importance to people's subjectivity, and enhance residents' psychological identification with

the outdoor environment.

Table 2- 6 Theoretical Content on Community Renewal and Transformation in Foreign Works

Title	Author	Main Theoretical Content
"The Death and Life of Great American Cities"	Jane Jacobs	Emphasizes the importance of the diversity and mixed-use of urban streets for community vitality, arguing that various activities on the streets can promote natural supervision of the community and strengthen the connection between neighbors
"Communication and Space"	Yang Gail	Focuses on people-centered space design, emphasizing the quality and vitality of streets and public spaces, and the concept of urban renewal through community participation
"Pasted City"	Colin Rowe	Urban renewal should be a gradual, adaptive, and inclusive process that respects history, cultural diversity, and involves residents
"Production of Space"	Henri Lefebvre	Space is not just a physical environment but a product of social relations. Community renewal should consider how space is shaped by social forces and how it affects social structures and individual behavior
"A History of Urban Development"	Lewis Mumford	Communities should develop like living organisms, which means renewal should be in harmony with the history and culture of the community, preserving its uniqueness and continuity
"The Non-Tree Structure of the City"	Yasuhiro Takeuchi	Proposes that urban renewal should explore the complex hierarchical relationships between residential communities and human behavior, rather than simply removing connections
"The Image of the City"	Kevin Lynch	Cities should have clear identifiability and connectivity, using five elements of paths, edges, districts, nodes, and landmarks to shape the readability of the city and enhance residents' sense of belonging

(Source: compiled by the author based on relevant information)

By combing through relevant literature, we can see that the focus of foreign community renewal theories, methods and policies has gradually shifted from simple material environmental improvement to community renewal that focuses on environmental improvement and vitality enhancement, ultimately achieving a multi-dimensional community revitalization that includes material, economic, social and environmental improvements. The renewal method has also changed from large-scale demolition and reconstruction to small-scale gradual improvement, emphasizing a continuous process.

### 2.3.2.2 The Development and Research Status of Domestic Community Renewal Theory

China started research on community renewal relatively late. In May 1991, the Ministry

of Civil Affairs first proposed to include community construction in the community service system. Subsequently, in November 2000, the concept of community construction was clearly put forward in the document "Opinions of the Ministry of Civil Affairs on Promoting Urban Community Construction Nationwide" (Zhongbanfa [2000] No. 23).

As China's urban development gradually shifts from incremental development to stock development, the renovation of old residential areas has begun to be considered and studied from multiple perspectives, including communities and streets. Early community renewal research focused on the discussion of renovation models and design concepts. Among them, Zhao Min (2010) proposed a "gradual" development theory for old residential areas, aiming to improve the quality of urban space and improve the quality of life of residents<sup>[60]</sup>. Based on the study of foreign residential renovation concepts, Xu Zhiqiu (2017) proposed an idealized living model suitable for the elderly from the perspective of community-based elderly care, emphasizing that in the process of renovation and renewal of old residential communities, it is also necessary to consider the preservation and exploration of cultural elements such as urban context and spatial form; Liao Yuejun (2019) adopted a micro-renovation method from the perspective of cultural excavation to explore community culture, realize the continuation of the context and cultural heritage of old urban communities, and thus improve the culture and quality of life of the community<sup>[62]</sup>.

The concept of micro-renewal in China originated from the theory of organic renewal proposed by Professor Wu Liangyong in the early 1990s, which advocated the exploration of small and flexible urban renewal methods. In the two articles "Organic Renewal of Old City Renovation" (1995) and "Organic Renewal of Traditional Siheyuan on the Road to Quality" (2005), Academician Wu Liangyong proposed and elaborated on the concept of "organic renewal" based on the renovation of Beijing's old urban area and the renovation of Juer Hutong in Beijing in the West<sup>[63][64]</sup>. He advocated that in the process of urban renewal, the original urban texture and historical context should be maintained, the inherent order and laws of urban development should be followed, and the sustainable development of the city should be achieved through small-scale and gradual methods; in the process of renovation of old

communities, reasonable adjustments or minor renovations should be made to the local spatial environment to make these spaces more in line with modern living needs and residents' activities, thereby achieving a gradual and progressive organic renewal of the entire old community.

China's urban design and renewal is gradually shifting from extensive to fine, from "top-down" mode to "bottom-up" people-oriented orientation, in this process, the transformation mechanism of "micro-renewal" has played an important role<sup>[65]</sup>. Hou Xiaolei (2022) further studied the "participatory micro-garden design" and adopted the progressive transformation method to carry out micro-renewal and design governance of multi-dimensional correlation of people, objects and space in the micro-space of old residential areas, demonstrating its potential as a sustainable and effective way in the micro-renewal of urban communities<sup>[66]</sup>.

To sum up, China's research on the renewal of old urban communities has gradually become an important part of urban renewal from the basic theoretical research in the 1990s. From the initial research on strategy and institutional reform, it has gradually shifted to more refined and multi-dimensional research directions such as community micro-renewal, autonomous renewal, public space improvement, environment construction and age-appropriate design. The research perspective has also shifted from special groups such as the elderly and children to the transformation model applicable to all age groups. In terms of community governance, the traditional management model has also been transformed into a new multi-participation management and renewal method. In the future, China's related research direction is expected to shift from efficiency to quality, from a single subject renewal model to a multi-subject renewal model, and from the traditional renewal concept to a more forward-looking renewal concept.

### 2.3.3 Domestic and Overseas Research on the Renewal of Community Public Spaces

The book "Principles of Urban Planning" divides the concept of urban public space into two categories: broad and narrow. Broad public space includes outdoor and indoor spaces of



public facilities, while narrow public space refers to outdoor spaces used by people in their daily lives and social activities, such as squares, parks and streets. As part of urban public space, community public space provides residents with important places for daily outdoor activities and social interactions<sup>[67]</sup>. Its service scope is mainly limited to the community, and its service objects are community residents, aiming to promote public participation. This type of space is created through the interaction between subject and object, emphasizing its openness and publicity, and has a close impact on the quality of life of residents.

The community public space discussed in this paper is mainly the narrow sense of public space, that is, the square, green space, outdoor landscape, open area, small park, street and other places within the community that meet people's living needs and provide use functions. Such as fitness grounds for the elderly, health grounds, distribution grounds, multi-functional sports grounds, day care grounds, entertainment venues, community landscape greening, streets and traffic Spaces between houses and other areas.

#### 2.3.3.1 Research on the Renewal of Community Public Spaces in Foreign Countries

The research on the shaping and renewal of community public space in western countries is closely related to the development of modernist architectural trends and related urban theories. On the whole, the research on community public space under the western modern urban theory can be traced back to the rural city and other related theoretical studies in the 19th century. From the perspective of time span, the research and practice of community public space in western society can be roughly divided into three stages.

The first stage was the initial exploration of modern urban and community space from the end of the 19th century to the first half of the 20th century. During this period, people under the background of industrialization gradually began to pay attention to the problems of urban construction and living environment, and the theoretical and practical exploration of new modern cities and communities began gradually. It was first represented by Howard's Garden city theory and Gaddis's comprehensive planning thought. The former emphasized the integration of green space and multifunctional community, which directly influenced the renewal of community public space at that time, while the latter believed that the

development of a city should not only pay attention to the material environment, but also pay attention to cultural traditions and social problems, and that a city is an organism<sup>[68]</sup>. In 1929, Perry proposed the concept of "neighborhood community", which laid the concept of modern community planning unit, advocating the importance of supporting infrastructure, public space, green space and service facilities of residential areas, paying attention to the basic needs of residents' life, so as to promote the social interaction of residents' life and the healthy development of the community.

The second stage was from the end of the Second World War to the 1980s. In this stage, with the reconstruction of cities after the war and the process of globalization, the idea of modernism occupied the dominant position in the construction of urban and community public space. The modernist thought, represented by Le Corbusier's functional zoning theory and residential area theory, emphasizes the functional rationality of community public space design, including the clear division of functional zoning and the clear definition of road grade and other modernist urban theories, aiming to meet people's basic needs of life. Since the 1960s, European and American scholars began to reflect on the urban renewal mode of large-scale demolition and reconstruction, and gradually explored the small-scale progressive urban renewal mode that is more in line with the human scale in theory and practice. During this period, the importance of public space in urban renewal was established. For example, the famous American sociologist Jane Jacobs put forward the idea of "small-scale gradual transformation" in his book *The Death and Life of Great American Cities*. She argues that large-scale urban renewal and redevelopment often destroy the diversity of cities, while maintaining urban diversity at the community level requires meeting the diverse needs of different functions and different populations.

The third stage began in the 1990s, during which the idea of urban community public space began to be dominated by postmodernism. During this period, community public space was regarded as a key indicator of urban comfort and diversity, and an important symbol of improving the quality of life. Relevant important theories include community livability theory, new urbanism theory and intelligent growth theory, as well as William White, Kevin Lynch

and other scholars who have made important contributions to community livability. For example, the new urbanism theory puts forward a new urban and community model, advocates sustainable, comfortable and environmental development direction, pursues multi-functional and diversified community forms, and emphasizes the core position of public space in community construction. Improve the convenience of life of residents by providing quality public space and high level of public services; In addition, it also advocates the regular organization of various activities in the community to promote interaction and communication among residents, and gradually enhance the sense of belonging of residents to the community.

On the whole, after three stages of development, the research and renewal strategies of community public space in foreign countries, especially in the West, have changed from the initial emphasis on the improvement of material space to the emphasis on the overall governance of living environment and community vitality, as well as the response and promotion of residents' life, so as to realize the unified improvement of material, place and spirit of community space. The related renewal method has also changed from the monolithic demolition and reconstruction to the more subtle and gradual renewal strategy today.

### 2.3.3.2 Research on Renewal of Community Public Space in China

Domestic research on community public space started relatively late, probably since the 1980s, mainly focused on the field of architectural design and urban planning at the beginning, and then extended to sociology, economics and other fields. With the development of modern communities in China for several decades, some communities have shown a state of aging public space and are in urgent need of renewal. In recent years, theoretical research on public space in old communities has gradually become a key research direction of the discipline.

Table 2- 7 Related Research Literature on The Renovation of Domestic Community Public Spaces

Author	Year	Title	Type of Literature
Yang Lisheng	2019	Research on the Micro-Renovation of Urban Community Public Spaces	Master's Thesis
Wu Yan	2015	Research on the Environment of Suitable Public Spaces in Urban Communities in Chongqing	Doctoral Dissertation
Wu Xuejin	2010	Research on the Livability of Urban Community Public Spaces	Doctoral Dissertation
Jiang Yibo	2019	Research on the Renovation Design of Public Spaces in Old Communities Based on the Concept of Organic	Master's Thesis

Author	Year	Title	Type of Literature
Liu Gaoxin	2021	Renewal: A Case Study of Xinjingdong Community in Xindu District, Chengdu Research on the Aging-Friendly Renovation of Public Spaces in Old Communities under the Background of Elderly-Friendly Environment	Master's Thesis
Song Ruocen	2019	Research on the Design Strategies for the Micro-Renovation of Public Spaces in Old Urban Communities	Master's Thesis
Zhang Dan	2019	Research on the Renovation Design of Public Spaces in Old Urban Communities Based on Urban Acupuncture	Master's Thesis
Lou Yuhao	2019	Research on the Aging-Friendly Renovation Strategy of Public Spaces in "Street and Alley" Type Communities in Old Urban Areas of Hangzhou	Master's Thesis
Ma Teng	2022	Research on the Renovation Strategies for Public Spaces in Industrial Communities in Beijing Based on Collective Memory	Master's Thesis

(Source: compiled by the author based on relevant information)

From the perspective of research content and related design, the domestic research on the renewal of community public space can be divided into three directions. The first is the research on the subject theory and renewal direction. The most typical and important research direction in this part is the research on organic renewal proposed by Professor Wu Liangyong since the 1990s. The early research on community renewal can be traced back to Professor Wu Liangyong's practice of a series of renewal of Beijing hutongs. He put forward the theory of organic renewal in his book *Beijing Old City and Juer Hu Tong*. This theory advocates that by limiting the scale of the object of transformation, accurately grasp the transformation needs, and moderately eliminate some elements in the existing environment to accommodate the new content. In addition, the theory also emphasizes the local adjustment of the existing environment and the maintenance of the original pattern and form, so as to improve the quality of the environment and finally achieve the goal of organic renewal. Based on the concept of organic renewal, since the new century, domestic research on community public space renewal has gradually turned to a more refined renewal direction and the advocacy of micro-renewal mode.

The second point is based on the perspective of community residents and space users, for the relevant groups of renewal research. Similar to refined renewal strategies, such perspectives focus on specific users of community public Spaces, such as the elderly and

children, and explore renewal strategies and practical methods for specific groups. For example, in view of the current increase in the proportion of the elderly population and the deterioration of the environment in the old communities, scholars have successively proposed the research directions of community public space based on the elderly group, such as "age-appropriate", "age-friendly communities", and "original residents' security for the elderly". Among them, Zhang Shuai and Zhang Xicchen (2019) summarized a series of age-appropriate optimization measures for the problems existing in the outdoor public space of the renovated old communities based on specific age-appropriate renewal design practices. In particular, the author emphasizes that by setting up activity Spaces suitable for the elderly and children to use together, the interaction between the elderly and children can be promoted in the same space, thus alleviating the problem of intergenerational relations, and suggests the introduction of horticultural therapy to enhance the physical function and promote the healthy development of the elderly<sup>[69]</sup>. In his paper, Zhang Junhan (2014) conducted an in-depth analysis of age-appropriate space, summarized the design characteristics of age-appropriate space, and proposed the design method of age-appropriate renewal of public space in old residential areas from three aspects: activity space, space facilities and space landscape<sup>[70]</sup>.

The third point is to discuss the renewal of community public space based on specific use perspectives and practical projects, combined with specific cases, and to add research methods such as comprehensive evaluation and post-use evaluation, to summarize and evaluate the influencing factors and renewal strategies of space, and to discuss and reflect on the details of space-related renewal strategies and techniques through specific implementation plans.

To sum up, with the development of The Times and the improvement of residents' material living standards and spiritual life needs, China has paid more and more attention to the renewal and quality improvement of community public space, and relevant theoretical research has begun to get focus, and has been further verified and developed in concrete practice. Compared with the traditional emphasis and improvement of the material space environment, the renewal of community public space has gradually turned to a more complex,

equal emphasis on material space, humanistic spirit and use needs, and diversified participation. Based on the improvement of the material environment of the community, the humanistic environment of the community is further improved and the humanistic care of the community is enhanced.

## 2.4 Case Study

### 2.4.1 Comprehensive and Complete Community Renewal with Multiple Participation -- Guangzhou Sanyanjing Community Renewal

#### 2.4.1.1 Basic Overview of Community

Sanyanjing Street is located in Yuexui District, Guangzhou City, divided into Shangshang Street, Xiajie two sections, located in the northeast of the municipal government, Yingyuan Road to the east of Dahua Park, Sanyanjing Street north from Dahua Street, south to Sanyanjing Street, east to Renshou Street, west to Sanyanjing Street, Upper Street No. 8, the original well has a "pin-shaped" round hole street, so named Sanyanjing Street. Sanyanjing community covers an area of 9.08 hectares, with 3,576 households and a total permanent population of 9,774. The community is close to the traditional central axis of Guangzhou and has significant transportation and location advantages. However, the current environment of the community needs to be improved urgently. Most of the buildings in the existing community were built in the 1980s and 1990s, with about 60 old buildings, and with the gradual aging of the community, the public space in the community is also seriously insufficient and the accessibility is poor. It is difficult to meet the needs of the daily activities of the elderly and children, and the overall evaluation of the community is difficult to meet the functional requirements given by its geographical location.

In addition, the renewal of Sanyanjing community also faces the corresponding challenges of typical "double old community". First, the community has a large elderly population and is facing severe challenges of aging. By 2023, there will be a total of 3098 elderly people over 60 years old in the community, accounting for more than 30%, far exceeding the standard of 10% in an aging society. Second, due to the age of community construction, some buildings and public facilities are old and even badly damaged, and a large

number of height differences inside the site also cause a lot of inconvenience and security risks for the elderly's travel and activities.

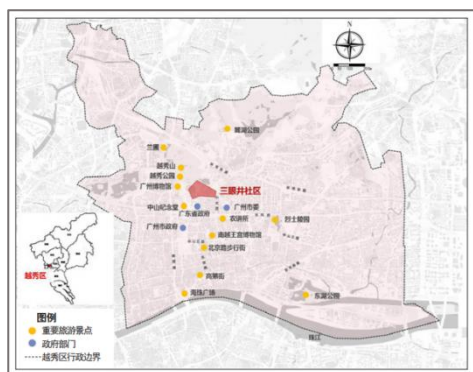


Figure 2- 2 Location Map of Sanyanjing Community

(Source: the author redraws according to reference<sup>[71]</sup>)

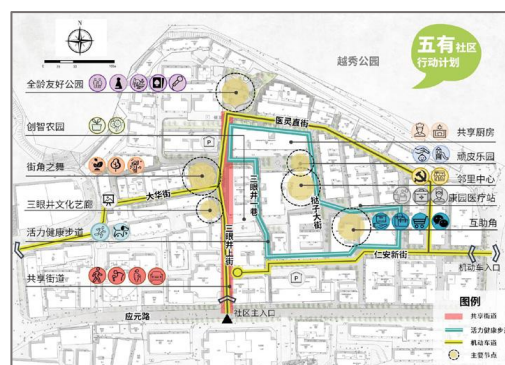


Figure 2- 3 Schematic Diagram of Resource Allocation for Sanyanjing Community

(Source: the author redraws according to reference<sup>[71]</sup>)

In response to the renewal needs and realistic difficulties of the community, Guangzhou has organized multiple parties to carry out renewal design work for the community since 2019, focusing on solving the pain points such as the actual material aging and the aging of personnel in the community.

#### 2.4.1.2 Community Renewal in Hardware Dimension









In view of the current situation and problems within the community, based on the needs of the main population, the idea of a healthy community friendly to the elderly and children was chosen in the community renewal work and program design<sup>[71]</sup>. The implementation mechanism of micro-transformation and follow-up maintenance was summarized, aiming to provide reference for the micro-transformation of the old community under the goal of "healthy China".

With reference to the practical considerations and needs of the community, the design principle can be condensed into a "five" community with "something to appreciate, something to do, something to support, something to enjoy and something to help". "Rewarding" refers to creating a cultural landscape that can tell the story of the community and be close to the lives of residents. "Do Something" aims to create barrier-free and safe streets for the elderly and children. "Some support" refers to the construction of all-age friendly community service

facilities; "Yule" provides children's play areas full of fun; By combining the operation and maintenance of community public space, "Youhelp" guides children and the elderly to participate in the construction of healthy communities and realize the common healthy development of communities and residents.

Based on the concept of "five" communities, the hardware dimension of the community's public space has been renewed to add all-age parks, pocket parks and other activity Spaces, and set up auxiliary and age-appropriate safety facilities. Different activity themes and functions are arranged in different positions and forms of community public Spaces to increase the communication between the old and the young and the neighbors. And configure different supporting facilities to meet the different activity needs of the elderly; Existing conditions such as trees and height difference retained in the site are utilized to enhance the interest of the space and provide multiple experiences in physical, sensory and social aspects. The edge space such as street corner is used to improve the original single space energy, give new functions and experiences of multi-layer interaction, and enhance the possibility of social promotion; At the same time, the shared streets of the community are created, and the main old and young friendly Spaces in the community are coordinated and connected, forming a vitality and health ring. By minimizing the number of parking Spaces and ensuring that walkers have full rights of way, the fruits of healthy community building are shared by all.

Table 2- 8 Renewal and Construction of Hardware Dimension of Sanyanjing Community Public Space

Space Name	All-Ages Friendly Park	Naughty Playground	Community Green Space	Shared Street
Before Renovation				
After Renovation				

(Source: The author compiled the relevant information based on the reference<sup>[71]</sup>)

The community has the characteristics of significant height difference and spatial dispersion, and the connection between the Spaces is not close enough, which brings great inconvenience to the elderly to buy vegetables and take children with carts, and also increases



the safety risks of the elderly when walking. In the process of several renovations, emphasis was placed on the barrier-free design of the community's public environment: first, to add barrier-free access in the position with steps; Secondly, set a gentle slope at the entrance and exit of the sidewalk; Thirdly, improve the blind track system of the community, remove the obstacles on the blind track, and form a coherent blind track network; Finally, signs such as high-difference safety warning signs and barrier-free access signs are set up<sup>[72]</sup>.

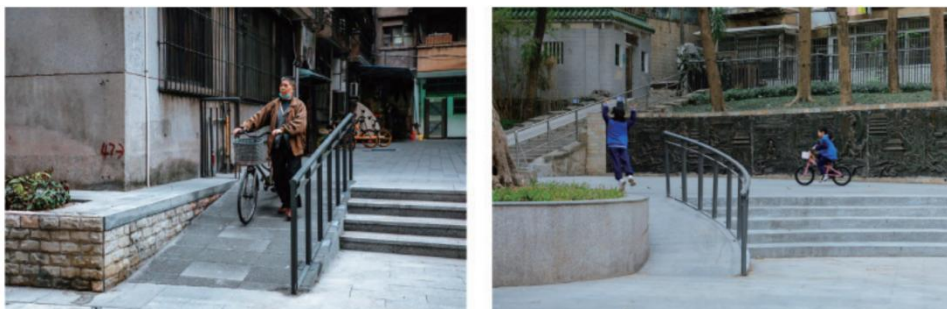


Figure 2- 4 Update of Barrier-free Facilities in Sanyanjing Community

(Source: References<sup>[72]</sup>)

At the level of space design suitable for aging, the life needs of the elderly are also fully considered in the renewal. Considering that the living radius and activity range of the elderly are relatively small, the community focuses on re-designing the small space of the public area in the process of renewal, and carries out functional zoning and separation of sports and sports activities. Eliminate the outdoor vertical height difference, add gentle slope and other measures; At the same time, combined with the psychological characteristics of the elderly, the space design also considers the promotion of social interaction and neighborhood communication, and eliminates the negative psychological emotions that the elderly may have. For example, semi-open space is often used to create a certain sense of enclosure, so as to achieve barrier-free construction at the psychological level of the elderly.



Figure 2- 5 Comparison of the Square Space Before and After the Renovation

(Source: References<sup>[72]</sup>)

In the transformation of the traffic system, the focus is on building the vitality and health of the slow walking path, providing convenient passage for the elderly with mobility difficulties, so as to improve the accessibility and convenience of various nodes and facilities. Planning to realize the separation of people and vehicles, giving priority to the protection of the slow-based mode of transportation. For the aging transformation of street space, parking Spaces should be reduced as much as possible, and sidewalks should be added and widened to ensure the safety of main travel paths. Through reasonable planning of people and vehicles, to ensure that the main street is mainly slow, and equipped with necessary auxiliary facilities, to improve the safety of the elderly travel. At the same time, the slow traffic environment is improved to enhance its recognition. In terms of the design of entrances and alleyways, the environmental quality should be optimized, and the recognizability and social interaction function of the traffic space should be improved by adding entrance exhibition walls, sculpture structures, three-dimensional planting, advertising signs and leisure activities facilities, so as to meet the needs of the elderly for walking, staying and communication.

#### 2.4.1.3 Community Renewal in Software Dimension

As a typical Dual-aged community, the renewal of Sanyanjing on the micro-transformation program based on the characteristics of the community and the perspective of friendship between the old and the young. At the same time, in order to awaken the sense of ownership of the community residents and guide them to actively participate in the renewal and construction of the local community, relevant institutions have joined forces

with universities, studios and other social forces to organize the activity of "Visiting the School - Hongqiao Street Art Intervention Micro-Transformation Workshop", depicting the historical scene of Sanyanjing community through artistic activities, on-site graffiti and other forms. Arouse the interest of local residents to participate in the micro-transformation of the community.

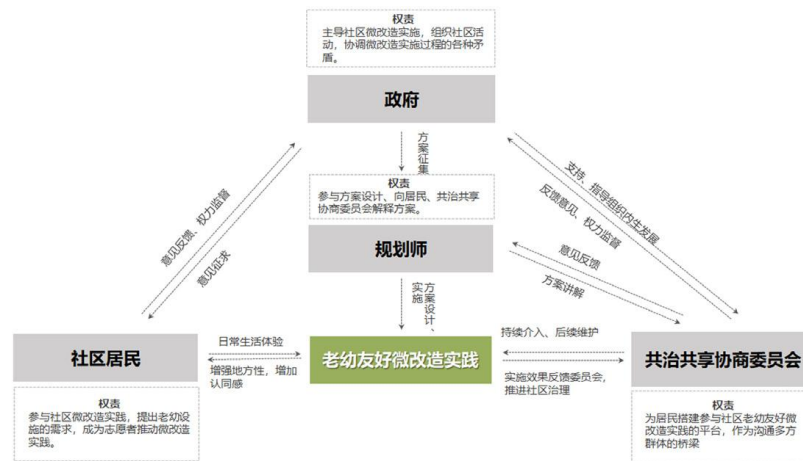


Figure 2- 6 Schematic Diagram of the Community Renewal Mechanism

(Source: References<sup>[71]</sup>)

In addition, in view of the lack of property services and management in communities, a global service governance model, a professional property management model, and a self-management model for owners are proposed to provide directions for the introduction of daily custody services<sup>[74]</sup>. In the construction of intelligent elderly care communities, online party members activities are organized by relying on platforms such as App to publicize the concept of old-age transformation, and enhance the awareness of community residents to respect, respect and love the elderly. In addition, new technology equipment such as telecom 5G intelligent platform, video surveillance, and intelligent smoke sensor are introduced to provide diversified elderly care services, realize intelligent management, and further enhance the level of intelligent service in the community.

#### 2.4.1.4 Community Renewal in Spiritual Dimension





From the spiritual dimension related to humanistic care, the main problems faced by the residents of Sanyanjing community are the intergenerational communication between the elderly and children in the community and the relationship between the elderly and their

neighbors. Therefore, in the process of community renewal, attention is also paid to the shaping and promotion of intergenerational communication and neighborhood relations by space and environment.

At the overall level, the community renewal activity uses the basic perspective of all-age friendliness, aiming at the commonality of the needs of the elderly and children groups in the community space, which is summarized as safety, recognizability, social appropriateness and experience. Among them, the safety is mainly reflected in the safety of the travel environment; Recognizability should highlight the local characteristics in the design; Social suitability requires that the possibility of sharing public space between the elderly and children be fully considered in the design; Experiential emphasizes the creation of interactive Spaces where the elderly and children can participate together<sup>[71]</sup>.

In the renewal of public space in the community, the creation of space theme and interest is also the focus of attention. As an old community with rich historical resources, Sanyanjing community also integrates local display into the concept of building the place in the spatial renewal. For example, in the design of pocket park, cultural art galleries and other facilities are built to put the culture of the community into the space in a physical form, forming a spiritual resonance space with rich experience.

Table 2- 9 Renewal and Creation of the Spiritual Dimension of Public Space in Sanyanjing Community

Space Name	Before Renovation	After Renovation
Sanyanjing Cultural Corridor		
Sanyanjing Cultural Corridor		

(Source: The author compiled the relevant information based on the reference <sup>[71]</sup>)

## 2.4.1.5 Summary

Sanyanjing Community in Guangzhou put forward the idea of sharing the street in the community renewal. Through the construction and spatial organization of the age-friendly public space, an age-friendly public space system is built in the community, which guarantees the daily activity needs of the elderly and children, and effectively promotes the healthy development of the community. It provides the reference of "Guangzhou experience" for the micro-transformation of the old and young friendly healthy community.

Table 2- 10 Summary and Inspiration of Sanyanjing Community Space Renewal

Category	Renewal Highlights	Renewal Content
<b>Spatial Layout</b>	Creation of functional and complete spatial nodes, optimization of shared system	Creation of multiple functional and complete spatial nodes, such as all-age-friendly parks and intergenerational gardens, ensuring the privacy needs of the elderly while providing a variety of public activity options. Establishment of a pedestrian system, community strengthening of vehicle flow, ensuring the safety of the elderly's travel, and improving the convenience of travel through barrier-free design. Detailed planning in the landscape aspect to enhance the beauty and functionality of the environment, providing a more suitable leisure environment for the elderly.
<b>Environmental Quality</b>	Improvement of green landscape, beautification of the environment	Improvement of the community environment, in addition to basic greening, includes lighting, landscape design, etc., to create a beautiful and comfortable living environment. Enhancement of landscape space design to improve the interactivity and comfort of green spaces, such as increasing the matching of water bodies and landscape plants.
<b>Humanistic Spirit</b>	Construction of community culture, strengthening of neighbor relationships, guidance of community cultural activities	Organization and promotion of various cultural activities, such as festivals, art exhibitions, and handicraft exhibitions, to enhance the cultural atmosphere of the community. Organization and promotion of various cultural activities, such as festivals, art exhibitions, and handicraft exhibitions, to enhance the cultural atmosphere of the community. Strengthening community cultural construction, organizing a variety of cultural and entertainment activities, encouraging the elderly to participate in community affairs, and enhancing the sense of community belonging.
<b>Spatial Aging Adaptability</b>	Improvement of functional facilities, community signage system	Enhancement and improvement of aging facilities, such as barrier-free ramps, handrails, elevators, resting seats, lighting facilities, and signage systems. Design and implementation of community signage systems with cultural characteristics, including road signs, directional signs, and information boards, to enhance the recognizability of the community.
<b>Intelligent Services</b>	Integration of intelligent management, convenient service facilities, operation and maintenance	Integration of modern technology, the community has applied intelligent management methods, such as 5G platforms and intelligent monitoring equipment, to improve the level of intelligent community services. Consideration of convenient service facilities in the update, such as breakfast shops and vegetable markets, as well as the improvement of barrier-free facilities, enhancing the quality of life for the elderly. Establishment of long-term operation and maintenance

Category	Renewal Highlights	Renewal Content
	mechanisms	mechanisms to ensure the sustainability of the renovation results, such as entrusting professional property service companies or guiding residents to self-manage.

(Source: compiled by the author based on relevant information)

## 2.4.2 Sustainable and Complete Community Renewal of Intelligent Upgrading -- Beijing Jinsong North Community Renewal

### 2.4.2.1 Basic Overview of Community

The renewal process of Jinsong North Community is based on the background of the increasingly serious aging of Chinese cities, and the realistic dilemma of the "421" population model caused by the family structure of traditional cities, which leads to the increasing number of elderly people living alone and empty-nesters in cities, and the decline of urban elderly communities, which leads to the exploration of the renewal mode of traditional double-old communities. Its highlight and reference significance are mainly related to the discussion and coordination of the renewal mode of the integration of community public spontaneity and multiple participation.

Jinsong Street covers an area of 5.2 square kilometers, divided into 8 subdistricts, built in the early 1980s, is a mainly residential community. The total population of the region is about 120,000, of which 62.3% are retired workers in the state-owned automobile and chemical machinery industries<sup>[75]</sup>. As Jinsong community is the first large residential area built in the early stage of reform and opening up, the community supporting facilities are imperfect and the infrastructure is aging, and the infrastructure is being upgraded before the fourth project. In addition to the problem of hardware facilities, there are a large number of elderly people living alone in the community, their children either live abroad or live far away from the elderly, unable to carry out daily care. Even if some elderly people can take care of themselves and complete daily activities alone, they still lack daily emotional communication and social satisfaction.



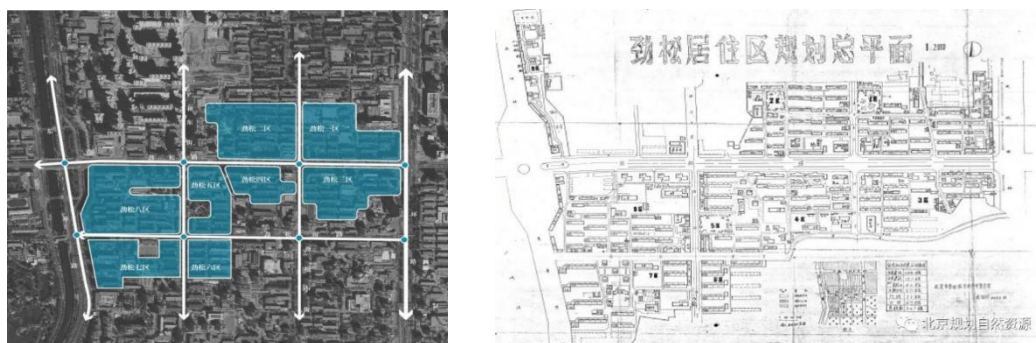


Figure 2- 7 Location Map of Beijing Jinsong North Community

(Source: Amap, Beijing Municipal Commission of Planning and Natural Resources)

In general, the status quo of Jinsong North Community before the renewal is very similar to Guangzhou Shigang Community from all aspects, it is located in the core area of the city, only two stops away from Beijing Chaoyang CBD, there are "no property, less supporting facilities, lack of management" and other "common problems" of old residential areas.

#### 2.4.2.2 Community Renewal in Hardware Dimension

For the level of hardware dimension, the renewal of Jinsong North community mainly starts from the following levels. First, strengthen the system of community public space. In order to effectively improve the quality of community public space, it is first necessary to carry out comprehensive planning from the macro level and build a multidimensional network system. On the one hand, take a systematic approach to improving public Spaces, especially in under-covered areas within the community. This can be achieved by connecting adjacent Spaces and optimizing the network of channels to improve accessibility and continuity, thus filling gaps in the coverage of public Spaces. For group-level public space, consider implementing renovation and moderately expanding the area, and for small public space, the strategy of "demolishing walls and restoring green, demolishing and building through green" can be implemented to efficiently utilize the underutilized land. On the other hand, the mismatch between public space and residents' actual use needs can be solved by sharing resources with the city's key function points and supporting service facilities. Such initiatives can not only build an inclusive and diverse system of urban functions, supporting various functions and people activities, but also maximize the potential of each space and promote the integrated development of the whole city, forming a mutually supportive and coordinated

development model<sup>[76]</sup>.

Second, for important spatial nodes, the renewal of the community shows multi-dimensional thinking. In order to deal with the problems of single function and insufficient facilities of the existing public space in the community, the community renewal adopts the principle of increasing the diversity of public space and improving the selectivity of space, and combines the transformation of refined hardware facilities to provide a better spatial basis for various activities, and carries out targeted design for various public Spaces in the community. For example, in the renewal of community square, the open space should be dealt with by changing the ground pavement, moderately elevating the terrain, or setting art installations with spatial definition, so as to create a place with clear boundaries and suitable for people to stay. For the negative space, the existing space should be redefined and divided, and some obstacles should be removed appropriately if necessary, so as to provide a better spatial basis for the crowd gathering and dispersive activities. In addition, the green coverage of the space is increased through plant configuration and landscape transformation, making the square space a comfortable place with multiple functions. For community parks, through opening measures and adding various kinds of living and leisure facilities according to the actual situation, in order to enrich the functions of the park and create high-quality living space for residents. As for the street space, on the existing basis, it can make rational use of the sidewalk, linear green space and other Spaces for overall design, and take the street as the link connecting various public Spaces, extending to each node by "connecting points with lines", so as to integrate the street with the site node and create a continuous and unobstructed slow space. At the same time, considering the appropriate scale of the slow space such as the community walking path and bicycle path, and aiming at the problem of the occupied street space, the design of zoning and management measures to achieve continuous optimization.

In terms of landscape construction, natural elements are widely used in the renewal of the external space environment of the community to create a complex shared space that integrates nature, society and culture. Through rational allocation of functional areas, these Spaces are transformed into small community gardens or activity squares, and fitness venues



and walking paths are added. In addition, through a variety of combination ways to optimize the community green landscape, create more "small landscape" embellish the community environment, and create the overall "big landscape" atmosphere. For example, through the clever collocation of water bodies and landscape plants, the environment is more interesting, and the final formation of a multi-functional community space environment integrating landscaping, sports and fitness, leisure facilities and cultural publicity<sup>[77]</sup>. In view of the idle space in residential areas, systematic transformation is carried out to further explore and provide more "gap" space functions to promote the composite sharing of space.

In general, the transformation of public space aims to expand the multiple functions of the space with relatively simple functions, and also hopes to enrich the functional attributes of the space through the interweaving and updating of various elements, so as to provide more diverse sensory experience for the daily activities of the elderly.

Table 2- 11 Renewal of Hardware Dimension of Jinsong North Community Public Space

<b>Comparison of Hardware Dimensions of Public Spaces in Jinsong North Community Before and After Renewal</b>				
Community Pocket Park Space Renewal	Community Pocket Park Space Renewal	Community Pocket Park Space Renewal	Community Pocket Park Space Renewal	Community Pocket Park Space Renewal
				
				

(Source: compiled by the author based on relevant information)

In terms of aging adaptability, the relevant renewal of the community is mainly reflected in the transformation of infrastructure. The first is to re-organize and renewal the street system to create an elderly friendly street system. In the design process, the needs of the elderly were fully considered, and the sidewalk space occupied by electric boxes and electric poles on the street was re-released, and the weak electric overhead line was processed into the ground. The

sidewalk was renovated and barrier-free facilities were added, thus providing a complete walking space for residents. Some elderly people living alone in the community like to bask in the sun or stay for a short time to chat on the street. The renewal of the street has improved the daily travel environment of the elderly and provided them with a safe and comfortable walking environment. Secondly, the original public facilities in the community space are upgraded and integrated into the modern age-appropriate design. The simple chess table in the small square in the community is renewed and the tables and chairs are reconfigured, so that the elderly can play chess in the landscape space with beautiful environment and perfect facilities. New materials are used to repair the facilities such as pavilions and simple booths. Enhance the comfort experience of the elderly.

#### 2.4.2.3 Community Renewal in Software Dimension

In terms of software dimension, the renewal of Jinsong North community has a very important reference significance, and its renewal mode has formed a well-known "Jinsong model", which provides a reference for the renewal of relevant old communities in the country.

In view of the actual conditions of the community, Jinsong North community is committed to building a community respecting the elderly by renewing its organizational model. According to relevant policies, the community implements preferential treatment for elderly people of different ages and physical conditions, and establishes a system of regular visits and accurate services; For the families of the elderly living alone, the alarm help device is equipped through the property; At the same time, the introduction of scientific and technological means to create intelligent governance solutions, such as installing cameras inside the unit door to record the travel data of the elderly; If the elderly do not go out for a long time, the property will come to the house for care. These measures aim to enhance public safety and create safe communities suitable for the elderly.

At the level of community management and service, Jinsong model guides community residents to establish various autonomous organizations in the co-creation activities, and builds the operating mechanism of residents' self-renewal governance by taking advantage of

the opportunity of community renewal and transformation, so that these autonomous organizations gradually become the backbone of community renewal and governance, and promote the community to become the main body with endogenous motivation. Finally, a long-term effective and regular self-renewal governance model will be formed<sup>[78]</sup>. In the co-creation model, residents' self-governing organizations and residents' shared consciousness are the key to community renewal and governance, and the process reflects significant socialization characteristics. The core is to enhance the cohesion of the community through the establishment of various types of residents' self-governing organizations, enhance the ability to act, and cultivate residents' sense of participation. The main driving force of this kind of socialization means is to gradually form a common consciousness through the participation of residents in activities such as discussion, implementation and evaluation, and take this as the core driving force of community self-renewal and governance. Such a relevant mechanism in the Jinsong model is the concept of "self-organization", residents through the organization of self-organization, collusion, co-construction, co-evaluation, sharing, practice community renewal of independent decision-making and operational self-management. This model can save the cost in the process of community renewal and operation as much as possible, and stimulate the enthusiasm of residents to participate in community work to the maximum extent, and enhance the neighborhood relations of community residents.

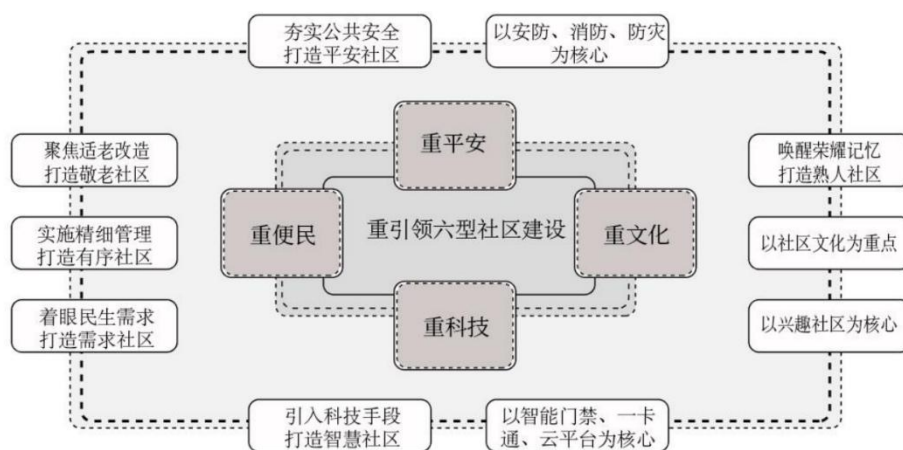


Figure 2- 8 Jinsong Model Community Renewal and Operation Mechanism

(Source: References<sup>[73]</sup>)

The key of community renewal governance lies in property and enterprise, which has

obvious marketization characteristics. The in-depth participation of social capital has improved the situation of lack of management and dilapidated environment in old communities, and transformed the renewal and governance of old communities from the traditional government-led model to the market-oriented mode requiring residents to purchase services. Property enterprises invest in environmental transformation, cultivate residents' awareness of service purchase, and achieve break-even through project operation, service charges, etc., and this "break-even" has become the core driving force of property enterprises in community renewal. This related mode is the "other organization" in Jinsong mode. The introduction of related service enterprises and properties can effectively improve the professionalism of service and management, and to a certain extent effectively solve the problems such as insufficient funds, complex property rights relations and interest conflicts between different residents in the community renewal operation. In addition, under this model, residents do not directly participate in the operation and specific work of the daily affairs of the community, but mainly participate in the discussion and decision-making, but also need to bear the correspondingly high daily costs.

On the whole, the Jinsong model summarized in Jinsong community renewal advocates that the participation of social forces can be attracted by market-oriented means, and the role of social capital and social connection can be enhanced. At the same time, give full play to the role of community and social service organizations, strengthen the leading role of the public in the renewal process, and improve the multi-party governance structure. In the management of public space, establish a long-term mechanism, combined with the use of the population, adopt a segmented time-sharing management model, in order to better match and meet the activity needs of residents, so as to achieve continuous maintenance and effective management of public space.

#### 2.4.2.4 Community Renewal in Spiritual Dimension

As a former unit system old community with a large elderly population, Jinsong community's spiritual dimension and humanistic culture level are mainly built for specific groups of people to meet their spiritual needs in daily life, and to preserve and promote the

development of community culture.

In the renewal of community public space, the improvement of space quality is not only limited to the transformation of material space, but also pays attention to the characteristics of individual behavior and space use, and integrates daily activities with diverse cultures to better meet the individual needs of residents. On the one hand, more activities can be introduced into the space, combining the characteristics of activities, and diversified theme activities can be carried out on weekdays and weekends to maintain the diversity and mixing of the space. On the other hand, by exploring community characteristics and integrating cultural elements, residents are encouraged to pay attention to and participate in the creation of artistic atmosphere in community public space, and jointly promote the sustainable development of community material space and cultural environment.

For example, in the renovation of the space, a cultural corridor in the community is added, which gives cultural attributes to the level of space, and provides a cultural space combining walking and leisure functions, so that residents can obtain a "community cultural identity". By organizing residents to jointly create a unique cultural atmosphere of the community, we advocate the community spirit of friendly neighbors and mutual help. The ground will be transformed into a plastic track suitable for elderly walking to meet the needs of daily activities; In the reconstruction of green space, the behavior of activities and life is integrated, the green open space is transformed into a small community garden, and the fitness activity venue is added, equipped with fitness facilities and walking paths. According to the results of the survey of community residents' wishes, the construction of table tennis and badminton courts to enrich the daily life of the elderly.



Figure 2- 9 Elderly-Friendly Rest Areas, Cultural Corridors and Community Reception Rooms

(Source: Beijing Municipal Commission of Planning and Natural Resources)

In terms of the humanistic attributes of the space and the creation of activities, the

community also actively organizes related activities, such as using the idle public space to set up a community viewing area and show movies at a fixed time every week. It can not only enrich the elderly's life for the aged and provide spiritual supplement, but also help the elderly regain the shape of collective consciousness during the work in participating in collective activities, so that their public consciousness can be subtly expanded, and their enthusiasm to participate in the daily operation of the community can be enhanced. At the same time, the new community meeting room is used as the cultural center of the community to organize daily cultural activities and learning.

#### 2.4.2.5 Summary

Jinsong North community has a strong reference for other similar communities in the country because of its community positioning and typical nature. On the whole, in addition to the aging design of the foundation, the renovation of the spatial level, and the reconstruction of the third line, the community renewal pays more attention to the exploration and construction of the community renewal and operation mechanism, and its model provides a reference for the relevant renewal of Shigang community involved in this study.

Table 2- 12 Summary and Inspiration of Jinsong North Community Renewal

Category	Renewal Highlights	Renewal Content
<b>Spatial Layout</b>	Optimization of space functionality, improvement of transportation system, flexibility and adaptability of space	Transformation of idle spaces into convenient stores and elderly activity venues to increase the functionality and diversity of public spaces. Renewal and improvement of public facilities within the community, including lighting, sanitary facilities, and information signage systems, to meet residents' daily needs. Optimization of public space layout to ensure accessibility for all residents, especially the elderly and those with mobility issues, to public spaces.
<b>Environmental Quality</b>	Comprehensive improvement of environmental quality, effective use of green spaces	Beautification and greening of the community environment, enhancing the aesthetic quality of public spaces, including traffic organization optimization, increased greening, and leisure facilities. Rational planning and design to improve the utilization rate and effectiveness of green spaces, providing more leisure and activity spaces for residents.
<b>Humanistic Spirit</b>	Community cultural construction, enhancement of community culture and identity, cultivation of a sense of belonging	Focus on community cultural development, establishment of distinctive signage systems to highlight community characteristics and strengthen cultural heritage. Introduction of community cultural activities and public art to enhance community cultural construction and increase residents' sense of identity and belonging.

Category	Renewal Highlights	Renewal Content
<b>Space Aging Adaptability</b>	Improvement and renewal of aging facilities, completion of public facility renewal	Renovation and supplementation of elderly service facilities, improvement of accessibility, and addition of leisure facilities for the elderly. Renewal and improvement of public facilities within the community, including lighting, sanitary facilities, and information signage systems, to meet residents' daily needs.
<b>Intelligent Services</b>	Intelligent community management, community services and activities, participation in community governance, improvement of services	Introduction of technological means, such as intelligent management platforms and intelligent monitoring equipment, to enhance the level of community service intelligence. Consideration of convenient service facilities in the renewal, such as breakfast shops and vegetable markets, as well as the improvement of barrier-free facilities, enhancing the quality of life for the elderly. Establishment of long-term operation and maintenance mechanisms to ensure the sustainability of the renovation results, such as entrusting professional property service companies or guiding residents to self-manage.

(Source: compiled by the author based on relevant information)

### 2.4.3 Reconstruction of the Complete Community Spirit with Care as the Core -- Renewal of Hanahata Community in Japan

#### 2.4.3.1 Basic Overview of Community

Similar to the aging process that China is currently experiencing, Japanese society has also experienced a serious aging crisis since the beginning of the new century, and a large number of residential communities built at the same time are also aging. Since the 1970s, the development of old residential areas in Japan has faced many challenges. In terms of physical space, the quality of living environment has gradually declined, and the insufficiency of public space and supporting facilities has become increasingly apparent. At the social level of population, Japan is facing serious problems of aging and fewer children, which are especially prominent in old neighborhoods, resulting in rising housing vacancy rates and insufficient social vitality<sup>[79]</sup>. At the same time, due to the special population structure and social consciousness, the proportion of empty nesters living alone in the old community is very high, and it is difficult to renewal.





Figure 2- 10 Schematic Diagram of the Location of Hanahata Community

(Source: the author redraws according to related reference)

Hanahata is located in Adachi Ward, Tokyo, 15 km from the city center. It covers an area of 191,000 square meters, with a total of 80 buildings and 2,725 households, and the population aging rate of residents reaches 54%<sup>[80]</sup>. Built in 1964, it is a masterpiece of the emergence of reinforced concrete residential areas in Japan, typical of the new collective housing built after World War II to improve the living environment of the country's residents. For more than half a century, with the improvement of living environment requirements and the aging of the community, the community is currently facing the problem of lack of public space, too high floor area ratio, outdated buildings and supporting facilities, decline in living quality, and serious security risks. The renewal of the community began in 2011 and is still in the process of renewal, and its content is more focused on the transformation of the material level.

The transformation of the community mainly relies on the market mechanism, the government and the civil forces as auxiliary support. UR (Urban Renaissance Agency), the owner of the land and buildings in the Flower Field Community, is the main driver of the project transformation and is responsible for the renewal design, planning and construction of the community. The Adachi Ward government focuses on the promotion work at the social level, regularly publicizes and publicizes renewal measures, and communicates with residents to timely feedback and adopt residents' opinions. The comprehensive community building agreement of the community and its surrounding areas will promote communication and coordination among residents at the institutional level and coordinate the relationship between



different stakeholders.

### 2.4.3.2 Community Renewal in Hardware Dimension

The space updating on the hardware dimension level is the main implementation part of the updating activity of Hanahata community. The basic goal of Hanahata Renewal is to create a vibrant residential area where everyone can live with peace of mind by connecting with life, different generations, environments and streets.



Figure 2- 11 Hanahata Community Renewal  
Functional Diagram

(Source:

<http://www.ur-net.go.jp/hanahata/vision.html>)



Figure 2- 12 Hanahata Community Renewal  
Structure Diagram

(Source:

<https://www.ur-net.go.jp/hanahata/scenery.html>)

The whole renewal project adopts the model of "subdivision and gradual completion", dividing the community into several plots according to the existing road network. For different plots, a variety of renewal methods have been adopted, including the reconstruction of some buildings, intensive renewal, active use of existing resources and use conversion strategies.

The basic goal of flower field renewal is to increase the area of public space, create a landscape suitable for stopping and leisure, and introduce commercial facilities and childcare facilities, so as to attract people, so as to realize the connection with life, generations, environment and streets, and ultimately create a green community suitable for everyone to live in. Among them, in the renewal of plots D, H, J, L and M, the existing spatial structure is retained, the original living function is maintained, and local transformation is mainly carried out for the public space. The damaged area of the facade of the building was repaired in plot D, and combined with the needs of public space, the children's activity area was designed and transformed, and fences and plant enclosures were added to improve the safety and comfort of

the space. A small-scale central park is built on the east side of Plot J, which not only makes up for the lack of public green space in the east of Hanahata Community, but also provides space for residents to interact. In addition, the main road on the north side of the plot is appropriately widened, forming a diversion channel for people and vehicles to ensure the safety of travel; Plots L and M use a micro-renewal design concept to transform the corner square and arrange casual seating at the road interchange.



Figure 2- 13 Renewal of Community Streets, Public Green Spaces and Pocket Parks

(Source: <http://www.ur-net.go.jp/hanahata/vision.html>)

In terms of spatial layout, Hanahata Community connects various plots through the axis layout, integrating scattered public Spaces into an organic whole, so as to enhance the spatial order of the community. Among them, the living axis is mainly used as a connecting channel for the internal traffic of the community, creating a convenient walking space, connecting residential buildings, commercial areas and public green Spaces. The urban axis is mainly connected to the commercial district, creating a vibrant and interesting space; The regional axis connects the main nodes in the community in series to realize the integration of the community and the surrounding environment, providing comfortable rest space for residents and surrounding users.

In terms of supporting facilities, at the same time, more public facilities and community businesses are equipped for residential buildings, including community public activity centers, rental apartments, retail catering, sports clubs, green parks, small squares, etc., to facilitate residents' daily life and create popular blocks.

#### 2.4.3.3 Community Renewal in Software Dimension

Similar to China's old communities, Japan's old community also does not have relevant service properties and more effective management organizations. The renewal of the community involved the participation of multiple parties, including UR, owner of the land

and buildings of the community, Adachi Ward government, Hanahata Association Council, community residents, and Uonuma City.

Among them, as an independent administrative legal person, UR's main motivation to promote community renewal is economic consideration. With the increase of empty housing rate, the economic pressure of operation and maintenance is gradually increasing, so improving the efficiency of space utilization has become an important goal of UR. At the same time, the Adachi District government, as the other main driving force of the project, is committed to improving the overall appearance and enhancing the vitality of the area by transmitting information between UR and residents. The Hanahata Association Council, jointly initiated by UR and Adachi Ward, provides a platform for communication and exchange among relevant parties, aiming to solve problems arising in the renovation process through planning and design solutions. Community residents can also participate in the renovation process by participating in the consultation council, putting forward personal suggestions or filling in questionnaires.

After the renewal, the typical entrusts management mode is adopted, the organizational structure of the Association Council is retained, and the management function of the association is given to it. In order to better coordinate the impact of the renewal project on the surrounding residents, the Flower Field Association Council also absorbed some representatives of the surrounding residents, which increased the time cost of communication and coordination to a certain extent, but also provided an important guarantee for the smooth progress of the renewal and transformation of the flower field group land. In order to obtain more support from community residents for the renovation project, the Hanahata Association Council decided to refer issues related to community public affairs to UR or the government for handling. The council holds regular town meetings to collect the opinions of residents, and the main contents of the meetings are compiled into brochures in graphic form and published on the official website and community bulletin boards. If residents have any comments on the renovation project during the renovation process, they can not only consult the Integrated Community Construction Department of the Adachi Ward Urban Construction Department for

feedback, but also reflect through the Hanahata Association Council and the Adachi Ward government.

To sum up, similar to the renewal and subsequent operation mode of Jinsong North Community in Beijing, the renewal of Hanahata Community also comprehensively utilizes various forces and plays an important role of social organization and capital operation in community regeneration. At the same time, in the follow-up operation and management service work, the reserved procedure system mainly plays a role. Such a mechanism effectively ensures the service quality, reduces the excessive disturbance to residents' energy, and ensures the residents' right to fully participate in community affairs and decision-making.

#### 2.4.3.4 Community Renewal in Spiritual Dimension

In view of the spiritual and cultural aspects of community residents, especially elderly residents, the renewal is mainly based on the living characteristics and habits of the elderly, and based on the actual situation of the community, aiming at the existing problems of wide area of flower fields, aging buildings and facilities, and high housing vacancy rate. On the one hand, based on the adjustment of the overall function of the region, starting from the actual situation, Choose different renewal strategies according to local conditions. It aims to create a heterogeneous community by adapting to local conditions and housing conditions. For example, differentiated design is adopted in the elevator expansion plan, and the original single residential land is re-adjusted and planned to ensure the living habits of the elderly under the special needs.

#### 2.4.3.5 Summary

The renovation of Hanahata Community focuses on but is not limited to the micro-renewal of the physical space, but also pays attention to the sustainable development of the community after the micro-renewal, is committed to strengthening the connection between space resources and social groups, and promotes the formation and development of social relations. In the process of renewal, the existing resources of the old community are integrated, the links between various blocks and regions are deeply explored, and the potential value of the public space of Hanahata community is explored. The micro-renewal transformation aims

to integrate with the existing site, so as to promote the subsequent organic development of Hanahata Community.

Table 2- 13 Summary and Inspiration of the Renewal of Japanese Hanahata Community

Category	Renewal Highlights	Renewal Content
<b>Spatial Layout</b>	Spatial layout optimization, multi-functional space integration, public space reconstruction	The community adopts a "planned division, block completion" model, dividing the area into different blocks and adopting different renovation methods for each block. Different blocks are designed with different functions, and the functions are interwoven and complementary. Emphasizing the functionality and comfort of public spaces, such as redesigning public spaces, adding small gardens and leisure areas, and replacing worn-out tiles with new ones to improve the quality of life for residents.
<b>Environmental Quality</b>	Creation of green spaces, greening and beautification of the environment	Construction of green corridors, small parks, and green spaces to increase the green area of the community, improving the living environment and providing more natural spaces for residents to relax and enjoy. Renovation and addition of public spaces, such as small parks and street squares, providing more social venues for residents and promoting interaction between neighbors.
<b>Humanistic Spirit</b>	Creation of social spaces, attention to special groups, integration of culture and environment	Creation of social spaces, such as small parks and street squares, providing more social venues for residents and promoting interaction between neighbors. Paying special attention to the needs of the elderly and children in the renovation process, such as setting up barrier-free facilities and children's play areas, reflecting the care for different groups within the community. Combining community renewal activities with cultural elements and environmental beautification, such as using local materials to build community activity centers, strengthening the cultural characteristics of the community.
<b>Space Aging Adaptability</b>	Improvement of infrastructure, renewal of public spaces	Improvement of infrastructure, such as roads, lighting, and safety facilities, ensuring the accessibility and safety of the community. Redesign of public spaces to be more spacious and easy to navigate, considering the activity needs and safety of the elderly.
<b>Intelligent Services</b>	Community participation mechanism, volunteer service and regional currency	Through the platform of the community association, residents can participate in community renewal decision-making, reflecting the importance of residents' opinions and needs. Encouraging residents to participate in volunteer service activities, and rewarding them with regional currency, which not only promotes the development of community services but also enhances residents' sense of belonging and responsibility to the community.

(Source: compiled by the author based on relevant information)

## 2.5 Summary of this Chapter

Through the dual perspectives of theoretical overview and case study, this chapter

systematically constructs a theoretical research framework and a practical research path for the public space renewal of Dual-aged communities under the concept of Complete community, laying a solid theoretical and practical foundation for the subsequent research.

At the level of theoretical overview, this study systematically comprehends the origin and development of the Complete community concept and clarifies its guiding significance in community renewal at home and abroad. The study points out that the concept of Complete community emphasizes the comprehensiveness of community functions, the comprehensiveness of services, and the continuity of Humanistic Spirit, and its three-dimensional synergistic theoretical framework of hardware, software, and spirit provides a systematic solution to the challenges of an aging society. The core value of the Complete community concept in terms of functional integration, cultural reshaping and service optimization is revealed through additional comparisons with other related theories, as well as the theory of positive aging, the theory of age-friendly communities and the theory of human environment science.

The section on Community renewal related research demonstrates the shift from large-scale bulldozing and redevelopment to small-scale incremental improvement and the emphasis on sustainable development through the study and comparison of the development of community renewal theories at home and abroad. Community renewal research on public space focuses on the optimization and enhancement of community public space, emphasizing the importance of public space in community life and the diversity of renewal strategies. Through the comparative study of the theory and practice of Community renewal at home and abroad, the characteristics and shortcomings of Community renewal in China are revealed, and an innovative direction is provided for the subsequent studies.

In the case study section, this chapter selects three representative community renewal practices, namely, the Three Eyes Well Community in Guangzhou, the Jinsong North Community in Beijing, and the Hanahata Community in Japan, and analyzes them in terms of the three dimensions of multiple participatory mechanisms, the upgrading of Intelligence Services, and the reshaping of the Humanistic Spirit. Community renewal in Guangzhou's

Three Eyes Well Community focuses on the construction of a friendly and healthy community for the elderly and the young, with the help of the “Five Haves” community concept, reinforcing the all-age friendliness of the community's service facilities, highlighting the ageing-friendly design, and enhancing the residents' sense of belonging and participation through artistic interventions; and Beijing's Jinsong North Community is known for its “Jinsong Model”, which is a model that has been adopted by the Chinese government. Jinsong North Community in Beijing is famous for its “Jinsong Model”, which realizes the marketization and intelligentization of Community services through the introduction of social capital and the establishment of residents' self-governing organizations, and at the same time strengthens the safety management of the Community and the self-renewal and governance capacity of the residents; and the renewal of the Hanahata community in Japan emphasizes the role of the market mechanism and coordination and cooperation of multiple parties, and adopts the strategy of block renewal and the integration of multi-functional spaces, which not only improves the community service facilities, but also enhances residents' sense of belonging and participation through art intervention activities. The integration of multi-functional space not only enhances the heterogeneity of space and community vitality, but also focuses on the protection and inheritance of community cultural characteristics.

The combination of theories and cases shows that the concept of Complete community is not only a systematic solution to the challenges of the aging society, but also an innovative path to realize the sustainable development of community space. Through the organic combination of theoretical review and case study, this chapter systematically elaborates the core value and practical significance of the Complete community concept, clarifies the theoretical framework and practical path of Dual-aged community renewal, and provides clear logical guidance and methodological support for the in-depth development of the subsequent research.

## Chapter 3 Construction of Complete Community Public Space Evaluation System

With the acceleration of urbanization and the aging of the population, the research on the concept of Complete community has become an important issue in the field of Urban Renewal. However, through combing and summarizing the relevant data, the author finds that there is still a lack of scientific and systematic evaluation system research on its theorization, which makes the community renewal design under the concept of Complete community may have a lack of precise direction and quantitative basis of the real problem. Therefore, through the combination of theoretical research and methodology, this chapter systematically summarizes and constructs the evaluation system of public space for Complete community, covering three dimensions, five criteria layers and fifteen index layers.

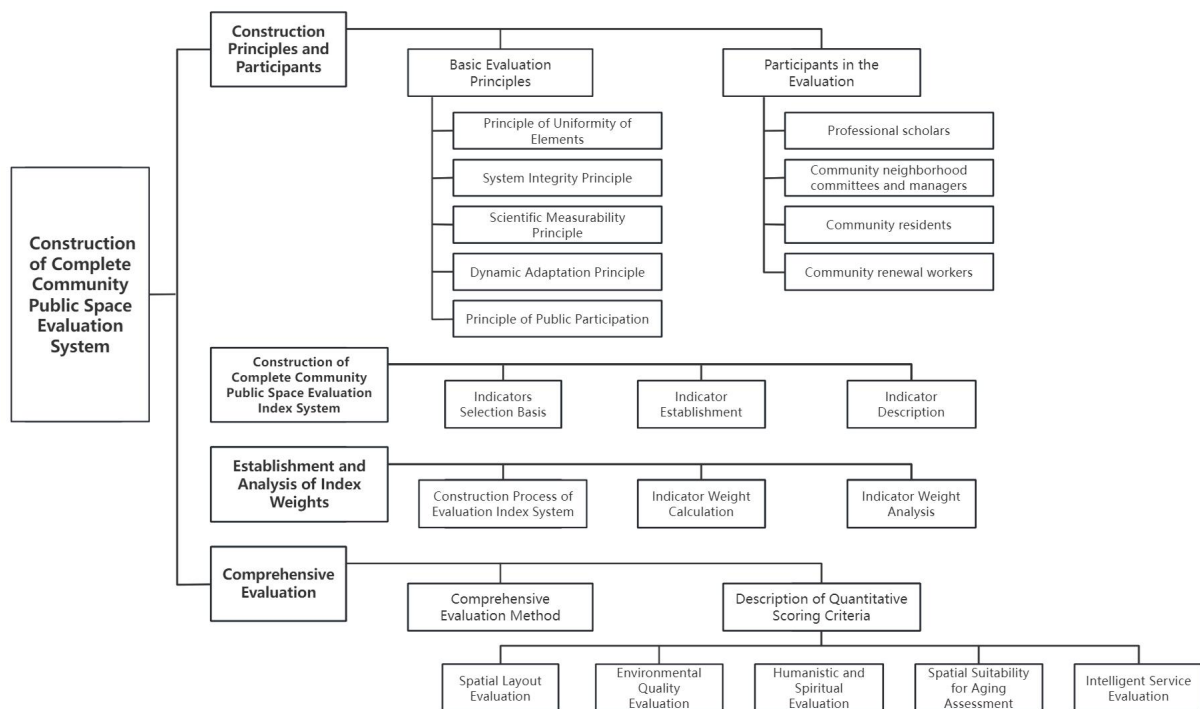


Figure 3- 1 Chapter III Chapter Structure Framework Chart

(Source: author's drawing)

This chapter specifies the principles for the construction of the evaluation system, including the five principles of unity of elements, system as a whole, scientific measurability, dynamic adaptation and public participation, to ensure the comprehensiveness and



scientificity of the evaluation results, to determine the weights of the indicators at each level through the hierarchical analysis method, to select the fuzzy synthesis evaluation method as the analytical method of the evaluation system, and to specify the quantitative standards for scoring.

## 3.1 Construction Principles and Participants

### 3.1.1 Basic Evaluation Principles

#### 3.1.1.1 Principle of Uniformity of Elements

Complete community pays attention to all aspects of daily life needs of community residents from a composite dimension perspective, and its coverage is complete and comprehensive. The evaluation of "complete community" under the background of the elderly in this paper should cover the core elements of the three dimensions of material environment, social service and humanistic spirit, so as to ensure the comprehensiveness and integrity of the index system. The hardware dimension should include physical environment elements such as space layout, facility configuration, barrier-free design, etc. The software dimension should be incorporated into institutional elements such as community management mechanism and intelligent service ability. The spiritual dimension should reflect social psychological elements such as cultural identity, neighborhood relationship and place memory. For complex hierarchical dimensions, it is necessary to conduct hierarchical decomposition of multi-dimensional elements through comprehensive evaluation and analysis, so as to form a distinct index structure to avoid one-sidedness in the evaluation process. In addition, the selection of elements should be combined with the multi-source data integration method in the network comprehensive evaluation, and make full use of community survey data, residents' satisfaction feedback and space use behavior data to ensure that the indicators are highly consistent with the real needs.

#### 3.1.1.2 Systematic Integrated Principle

The evaluation system should follow the system theory of "the whole is greater than the sum of the parts" and emphasize the synergistic effect and logical correlation among the

indicators. Firstly, a hierarchical model is constructed through analytic hierarchy process (AHP), and the complex system is divided into target layer, criterion layer and index layer, and the membership relationship and weight distribution logic among each level are clarified. Secondly, combined with the dynamic interaction characteristics of the comprehensive evaluation, the coupling relationship between the subsystems is determined to ensure the rationality and effectiveness of the evaluation system. Finally, the organic unity of "hardware-software-spiritual" is realized through systematic integration to ensure that the evaluation results can not only reflect the optimization potential of a single dimension, but also reveal the improvement path of the overall efficiency of community public space.

#### 3.1.1.3 Scientific Measurability Principle

The selection of relevant indicators should conform to the quantifiable and verifiable scientific research paradigm. The weight calculation based on analytic hierarchy process needs to rely on the score of relevant experts and consistency test to avoid the arbitrariness of subjective judgment. The measurement of relevant quantitative indicators should also be obtained through field or technical surveying and mapping to enhance the objectivity and comparability of results.

#### 3.1.1.4 Dynamic Adaptation Principle

The renewal of the public space in the old community has the characteristics of long-term and gradual, and the evaluation system should have the dynamic adjustment ability. On the one hand, the evaluation system can test the stability of index weights through sensitivity analysis and identify key factors that have a significant impact on evaluation results. On the other hand, the index content and threshold standard can be verified regularly according to the community development cycle and the change of residents' needs. For example, in the stage of accelerated community aging, the weight of age-appropriate facilities can be appropriately increased; In the context of intelligent community construction, the evaluation dimension of digital service capability needs to be further refined.

#### 3.1.1.5 Public Participation Principle

As the core users of public space, residents' opinions should run through the whole process of evaluation. In the assessment process, a participatory assessment method was adopted to collect residents' perceptions and demands on space quality through community meetings, questionnaires and interviews with focal people, and convert them into actionable suggestions for improvement. In determining the weight of evaluation indicators, residents' preference data can also be introduced to complement expert opinions and enhance the democracy and practical value of the evaluation system.

#### 3.1.2 Participants in the Evaluation

In order to ensure the rationality and accuracy of the evaluation results, the selection of the evaluation subject is very important<sup>[81]</sup>. In the process of determining the evaluation system, in addition to the participation of relevant scholars and experts in the professional field, the participation of neighborhood committee staff, community residents and community renewal workers is also needed. The four kinds of evaluators constitute the main participants of the evaluation system, which is closely related to the development of community renewal.

##### (1) Professional Scholars

Scholars in relevant fields can provide scientific and reasonable evaluation criteria, index system and weight allocation suggestions based on disciplinary background and theoretical research results, and provide technical support in data analysis and evaluation methodology. The participation of experts and scholars can effectively ensure the academic rigor and foresight of the evaluation system, and enhance its extensibility and applicability.

##### (2) Community Neighborhood Committees and Managers

Community neighborhood committees and relevant management agencies effectively communicate and convey the relevant opinions, suggestions and policy concepts of government departments to the community. They are the daily operation managers of community public space, and have a deep understanding of community development needs, residents' demands and resource allocation. The staff of the neighborhood committee have a more detailed understanding of the communities under their jurisdiction than the government

departments, and can provide more reliable and accurate assessment. In the evaluation process, they can participate in the coordination of data collection, residents' opinions collection, public facilities maintenance and other work, and provide realistic feedback on community governance and service supply.

### (3) Community Residents

Social residents are the direct users of the community public space and have the clearest personal experience of the actual situation of the community. Their experience and feedback have a decisive impact on the rationality of the evaluation results. Therefore, community residents are the main evaluation subjects.

### (4) Community Renewal Workers

Community renewal workers and related enterprise personnel conduct detailed research for community renewal, provide professional support, participate in community construction and long-term operation, and have a more comprehensive and detailed understanding of community conditions, so they can also serve as real and effective evaluators.

## 3.2 Construction of Complete Community Public Space Evaluation Index System

### 3.2.1 Indicators Selection Basis

#### 3.2.1.1 National and Local Evaluation and Design Standards

At present, the research on the theoretical framework of "whole community" has been relatively mature in China. At the same time, along with the issue of community renewal, a number of theoretical guiding standards and construction guidelines on whole community have been published, which have great reference significance for the research of this paper. From 2021 to 2022, the Ministry of Housing and Urban-Rural Development, based on local community construction experience, has issued the Guidelines for the Construction of Complete Residential Communities and the Notice on the Pilot Work of the Construction of Complete Communities. Relevant indicators can also refer to the "Urban Residential Area Planning and Design Standards" (GB50180-2018) stipulated by the Ministry of Housing and

Urban-Rural Development, which has been implemented since 2018; The relevant “GuangZhou Old Community Micro-Renovation Implementation Plan” and “GuangZhou Old Community Micro-Renovation ‘Three-Line’ Remediation Implementation Plan and Technical Guidelines (Trial)” issued by GuangZhou City Urban Renewal Bureau have also sorted out the renewal principles, objectives, as long as the content and specific remediation content of the old community. At the same time, localities have also explored the relevant paths of complete community construction according to the realistic requirements and theoretical guidance, and in recent years, Guangxi, Hubei and other places have respectively issued the “Pilot Implementation Program for Complete Community Construction” and the “Standard for Construction of Complete Residential Communities” (DB42/T 2277-2024) in Hubei Province, and so on.

In addition, some local construction plans similar to the concept of complete community, such as Hangzhou's "Implementation Opinions on Promoting the construction of future Communities with High quality", which put forward the future community construction model of "unified, three and nine scenarios", and Beijing's "Guidelines for the construction of intelligent Communities", provide support for the construction of intelligent communities. These relevant local guidelines also provide reference ideas for the selection of indicators.

Table 3- 1 Analysis of Relevant Policy and Standard Elements

Policy Name	Specific Requirements	Corresponding Indicators
<b>"Guidelines for the Construction of Complete Residential Communities"</b>	Clarifies the requirements for complete residential communities, including perfect service facilities, livable environment, intelligent services, and sound governance mechanisms. The pilot tasks include improving community service stations, kindergartens, elderly service stations, and promoting infrastructure construction and intelligent services to enhance community governance mechanisms.	Spatial layout, environmental quality, aging facilities, intelligent services, human care
<b>"Urban Residential Community Planning and Design Standards"</b>	As an important reference standard for the construction of complete communities, it proposes basic requirements for community planning, including service facilities, transportation design, greening landscape, etc., emphasizing the equalization and intelligence of community services, and proposing the construction of a community elderly care, child care, and medical service network to promote the digital transformation of community governance.	Spatial layout, environmental quality, aging facilities, intelligent services
<b>"Construction Standards for Complete Residential"</b>	Covers basic public service facilities, convenient commerce, municipal support, public activity spaces, and other construction requirements.	Spatial layout, environmental quality, intelligent services

Policy Name	Specific Requirements	Corresponding Indicators
<b>"Communities in Hubei Province"</b>		
<b>"Implementation Opinions on Promoting the High-Quality Development of Future Communities in Hangzhou"</b>	With the core of "unified three scenarios," it promotes the popularization of public services and digital empowerment, focusing on solving the needs of "one old and one young," and exploring models such as "intelligent elderly care" and "community economy."	Spatial layout, environmental quality, intelligent services, human care
<b>"Plan for the Construction of Complete Communities in Guangxi"</b>	The pilot tasks include building child care, elderly care facilities, promoting charging facilities and barrier-free environment construction, strengthening intelligent transformation (such as facial recognition, intelligent access control), and building a intelligent property platform.	Spatial layout, environmental quality, aging facilities, intelligent services
<b>"Guidelines for the Construction of Intelligent Communities in Beijing"</b>	Proposes the construction requirements for intelligent communities, including network facilities, convenient terminals, application scenarios, etc.	Spatial layout, intelligent services

(Source: compiled by the author based on relevant information)

### 3.2.1.2 A compendium of Research Related to Complete Community Evaluation Indicators

At present, the domestic research on the theoretical framework of "Complete community" has been initially mature, which provides some effective arguments for the selection of indicators. Some scholars combined with theoretical research to sort out and develop the evaluation index system related to the concept of Complete community, which provides a reference for this study. Based on the theory of "Complete Community" put forward by academician Wu Liangyong, Wu Xuesong comprehensively utilizes four design methods to systematically construct the evaluation index system of Complete Community planning and construction through the four stages of conceptual refinement, system construction, weight distribution and quantitative assessment, and summarizes 8 secondary indicators and 20 tertiary indicators (as shown in the following figure) through the division of hardware and software dimensions. The system is divided into hardware and software dimensions, summarizing 8 secondary indicators and 20 tertiary indicators (as shown in Figure 3-2). In addition to the relevant elements at the physical space level, the system also focuses on the importance of the indicators at the level of community operation and governance, related services, and cultural creation.

一级指标	二级指标		三级指标		权重	量化方法
	序号	指标内容	序号	指标内容		
建成环境 (硬件)	A	土地使用	1	土地使用混合率	0.11	混合度信息熵 LUM
			2	建筑密度	0.03	建筑基地面积/总用地面积
	B	空间形态与密度	3	人均住宅用地	0.03	总用地面积/总人口
			4	人口密度	0.03	总人口/总用地面积
			5	路网环通度	0.04	路网环通指数 $\alpha$
	C	道路交通	6	路网连通度	0.04	路网连通指数 $\beta$
			7	停车空间	0.05	社区户数/社区车位数
	D	绿地和开放空间	8	公共空间	0.09	公共空间活力度评价
			9	绿地空间	0.08	绿地率
	E	公共设施	10	公共服务设施	0.13	公共服务设施步行指数
			11	市政配套设施	0.12	实际负荷与实际供应的对比
社区治理与服务 (软件)	F	运营治理	12	党建引领	0.02	满意度调查
			13	公众参与	0.03	满意度调查
			14	管理机制	0.03	满意度调查
			15	便民服务	0.02	满意度调查
	G	服务水平	16	养老服务	0.02	满意度调查
			17	物业服务	0.02	满意度调查
			18	医疗服务	0.02	满意度调查
			19	社区文化价值	0.05	社区文化价值浓度 C
	H	社区文化	20	社区文化单元	0.04	社区文化单元密度 D

Figure 3- 2 Theoretical System Framework for Public Space Construction in the Perspective of Complete Community

(Source: References<sup>[44]</sup>)

Based on the concept of Complete community, Zhang Lemin et al. summarized the evaluation system of 17 primary indicators and 54 secondary indicators (as shown in Figure 3-3) from the eight evaluation panels of ecological livability, health and comfort, safety and resilience, convenient transportation, landscape characteristics, cleanliness and order, diversity and inclusiveness, and innovation and vitality. It can be seen that in addition to the hardware and software levels of community construction, the content of humanistic care levels related to the protection of elderly residents, life and living experience, as well as diversified and inclusive, has also been emphasized accordingly.

评价 板块	一级评价 指标	二级评价指标	评价 板块	一级评价 指标	二级评价指标
生态 宜居	生态环境	街区公园绿地服务覆盖率	风貌 特色	文化特色 历史建筑 保护	万人文化建筑面积
		采光较差的巷道长度比例			街区历史建筑挂牌率
		地面潮湿的巷道比例			街区历史建筑空置率
		环境噪声达标的巷道比例			街区历史建筑保护修缮率
健康 舒适	人居环境	垃圾收集点的数量与覆盖率	整洁 有序	街区风貌	街区内具有特色风貌的街道长度比例
		环卫设施的数量与覆盖率			特色风貌立面质量较差的立面面积
	老年保障	社区便民商业服务设施的数量与覆盖率			历史风貌保存完好的街区面积
		社区老年服务站的数量与覆盖率			历史风貌保存完好的单一成片的最大街区面积
	健康医疗	社区老年服务站的床位数与老年人口数量比例		多元 包容	街道立杆与空中线路规整率
		社区医疗服务站的数量与覆盖率			建筑立面整洁率
	教育配套	社区医疗服务站的床位数	多元 包容	群体包容	街道车辆停放有序率
		人均社区体育场地面积			道路无障碍设施设置率
		普惠性幼儿园覆盖率			街区低保人数比例
		幼儿园每千人学位数			街区流动租住人数比例
安全 韧性	设施安全	小学覆盖率	住房保障	群体包容	街区老龄化比例
		小学每千人学位数			街区公租房中人均住房面积低于国家标准的比例
		重要城市管网完好率			街区成套住房占总住房数量比例
		街区内涝点密度		创新 活力	街区主要的店铺类型
	居住安全	人均避难场所面积			重点街道的特色店铺数量比例
		消防服务点覆盖率			重点街道的创新店铺数量比例
		街区年安全事故数量			重点街道的流动性店铺数量比例
		街区内的危房数量			片区重点购物场所客流量
	交通 便捷	街区内的危房面积占街区总建筑面积的比例	新兴产业 发展	品牌档次比例	业态数量
		公共交通站点覆盖率			购物环境体验
交通 便捷	便捷	连续步行道路设施占整体道路数量比例	原有产业 状况	新兴产业 发展	品牌档次比例
		断头路占整体道路数量比例			业态数量
	停车设施 配置	人均停车面积			购物环境体验
		住宅停车位数量与街区总户数比例			
		商办及公共停车位配比			

Figure 3- 3 Theoretical Framework for Urban Physical Examination from Complete Community

Perspective

(Source: References<sup>[45]</sup>)

### 3.2.1.3 Relevant Research Literature Reference

At present, domestic research on the theoretical framework of "complete community" has been preliminarily mature, which provides effective arguments for the selection of indicators. In addition, according to the characteristics of community residents, the activity characteristics of the elderly are sorted out and deduced from the perspective of users.

Table 3- 2 Analysis of Activity Characteristics of the Elderly

Physical Space	Characteristic Description
Accessibility	Close to residential areas, easy to reach <sup>[82][83]</sup>
Culture and Education	Provide cultural activities and educational resources, such as libraries, exhibitions, lectures, etc., to meet the spiritual and cultural needs of the elderly <sup>[82]</sup>
Safety	Safe surrounding environment, public safety facilities, barrier-free design <sup>[84]</sup>
Spatial Comfort	Semi-enclosed transition spaces with strong gathering and hidden areas for



Physical Space	Characteristic Description
	long-term activities Semi-enclosed transition spaces with strong gathering and hidden areas for long-term activities <sup>[85]</sup>
Closely Related to Daily Behavior	Dependent on the old environment, spaces needed for behavior patterns <sup>[86]</sup>
Social Interaction	Equipped with public seating and resting areas for communication; organize regular community activities to promote neighborhood interaction <sup>[87]</sup>
Health Promotion	Encourage physical exercise; provide health education and consultation points, focus on the health of the elderly <sup>[88]</sup>
Maintenance and Management	Clean footpaths, regularly maintained public facilities <sup>[88]</sup>
Economic Affordability	Spaces that can simultaneously meet various activity needs, integrating leisure, fitness, and social interaction into a comprehensive space <sup>[89]</sup>
The versatility of the event space	Spaces that can simultaneously meet various activity needs, integrating leisure, fitness, and social interaction into a comprehensive space <sup>[89]</sup>
Richness of Activities	Regularly held various activities, such as holiday celebrations, cultural performances, health lectures, etc <sup>[89]</sup>
Cognition-friendly Design	Clear signage system, simple spatial layout, familiar landmarks <sup>[90]</sup>
Climate Adaptability	Provide shaded, rainproof resting areas, heating facilities, and plant species suitable for local climate conditions to improve the space's adaptability throughout the four seasons <sup>[91]</sup>

(Source: compiled by the author based on relevant information)

### 3.2.2 Indicator Establishment

Through the analysis and induction method mentioned above, combined with the relevant policy and construction guidance research of the whole community and the demonstration of relevant experts, five needs are proposed. Based on the theoretical research mentioned above, the five needs are preliminatively judged by combining the three dimensions of the whole community, and the evaluation index level and content of the public space of the old community under the concept of the whole community are sorted out. Under the concept of complete community, the public space evaluation of old communities is a complex multi-objective strategy problem. In order to better combine qualitative and quantitative analysis methods, the analytic Hierarchy Process (AHP) is adopted to assign index weights at three levels, namely, target layer, criterion layer and index layer.

The top layer is the target layer, which is the specific problem to be evaluated by the evaluation system. This paper evaluates the public space of the old community under the concept of complete community, which is the general target layer of the evaluation system. The middle layer is the criterion layer, which is the factor that needs to be considered in the implementation of the goal and the intermediate link of the analysis of the problem. Five

requirements are put forward according to the three dimensions of the complete community to further refine the assessed aspects. The lowest layer is the index layer, which is the most basic level designed for system construction. Through the division of three levels of indicators, each impact factor of the public space of the old community can be systematically evaluated.

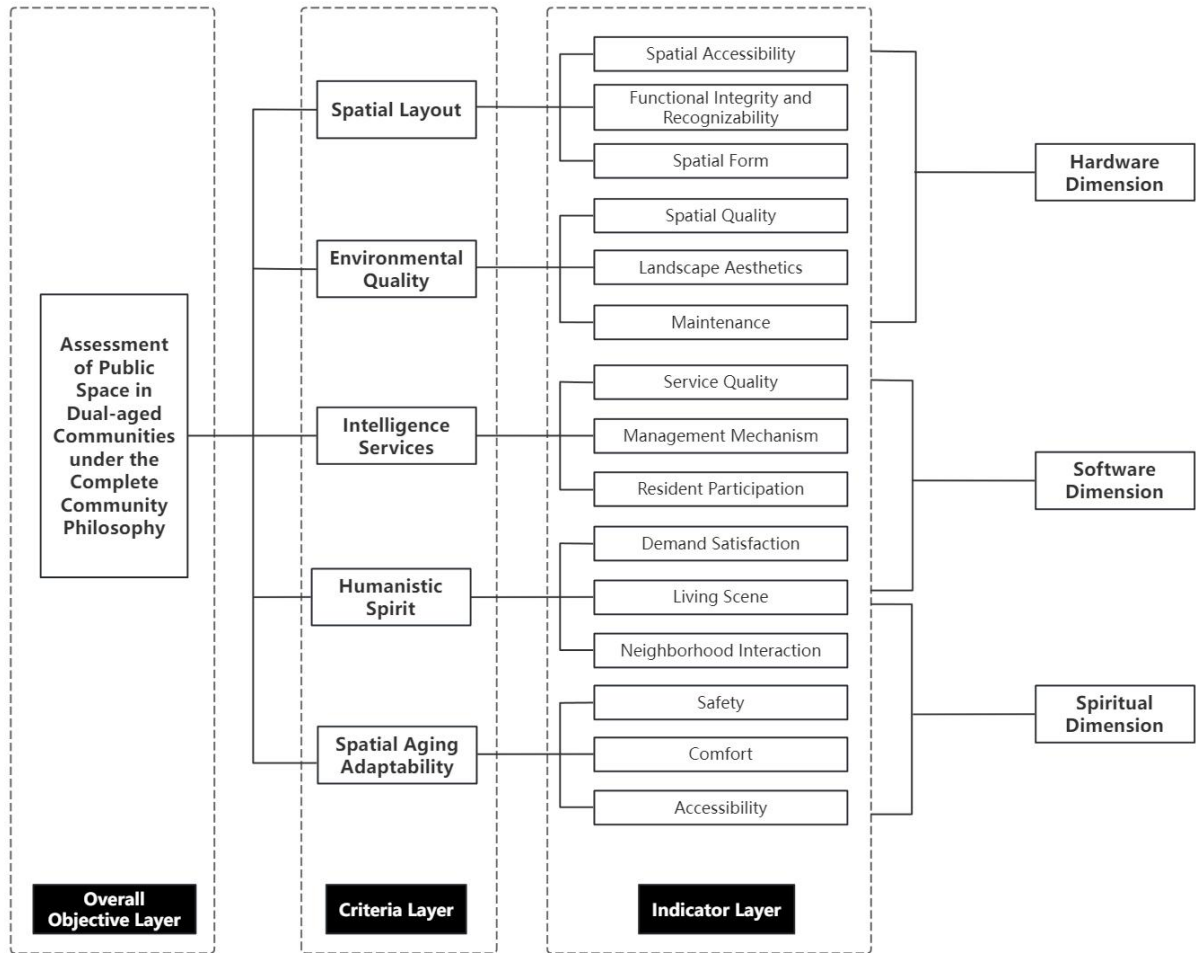


Figure 3- 4 Hierarchical Structure Model Diagram

(Source: author's drawing)

The indicator system is divided into three layers, in which the guideline layer indicators include the five constituent systems of Complete Community - Spatial Layout, Environmental Quality, Intelligence Services, Humanistic Spirit and Spatial Aging Adaptability; the indicator layer is mainly for the elements composing or influencing the guideline layer, and is the specific indicators that can be measured in the final isolation, including Spatial Accessibility, Morphology, quality, landscape style, use and maintenance and other 15 influencing elements.

### 3.2.3 Indicator Description

Based on the three dimensions of the whole community involved in this paper, the evaluation index system of the whole community is constructed by identifying the constituent elements of the whole community, summarizing the main characteristics, relevant policy standards and research literature. In order to further clarify the connotation of the index system, the indicators at all levels are analyzed and explained.

Table 3- 3 Explanation of the Evaluation Indicators of Public Spaces in Old Communities under the Concept of Complete Community

Criteria Layer	Indicator Layer	Indicator Description
<b>Spatial Layout</b>	Spatial Accessibility	The extent to which community members can conveniently and quickly reach the space.
	Functional Integrity and Recognizability	The completeness and ease of identification of the functions and facilities provided by the space, such as functional facilities included in the space.
	Spatial Form	The appearance, layout, and form of the space, such as the size and shape of the space.
<b>Environmental Quality</b>	Spatial Quality	The environmental conditions and material quality provided by public spaces.
	Landscape Aesthetics	The beauty and diversity of landscape design, overall style control of the community environment, such as the appearance of landscapes, visual impressions, and style features.
	Maintenance	The cleanliness of public areas, the maintenance of landscape facilities and infrastructure, etc.
<b>Intelligence Services</b>	Service Quality	The professionalism and satisfaction of community management services related to public spaces.
	Management Mechanism	The convenience of intelligent management mechanisms and models related to public spaces.
	Resident Participation	The extent of residents' participation in community management and service improvement.
<b>Humanistic Spirit</b>	Demand Satisfaction	The satisfaction of residents' psychological needs for humanistic living, such as temporary facilities, reading spaces, and service functions provided.
	Living Scene	The promotion and creation of daily life scenes for residents, collective memories, and living habits, such as leisure and entertainment for the elderly.
	Neighborhood Interaction	The promotion of community relationships and group interaction activities, such as providing comfortable communication spaces and facilitating social and cultural activities.
<b>Spatial Aging Adaptability</b>	Safety	The provision of safety guarantees and related safety facilities in the space, such as anti-slip strips, handrails, emergency call devices, and emergency aid facilities.
	Comfort	The comfort of space use, such as temperature, humidity, and lighting for the elderly.
	Accessibility	The accessibility of community facilities for the elderly, including barrier-free facilities.

(Source: compiled by the author based on relevant information)

(1) Spatial layout: Spatial layout is the basic framework of a complete community public space, and its rationality directly affects the convenience and activity efficiency of residents.

Spatial accessibility measures how easy it is for community members to reach public Spaces, such as walking distance and transportation convenience; Functional integrity and identifiability reflect whether the functional facilities provided by the public space are complete and easy to identify to meet the diverse needs of residents; Spatial form involves the appearance, layout and form of public space, and reasonable spatial form helps to improve the efficiency and aesthetics of use. Good spatial layout ensures that residents, especially the elderly, can easily reach the public space and participate in various activities.

(2) Environmental quality: Environmental quality is an important dimension to measure the comfort and attractiveness of public space, which directly affects the use experience and satisfaction of residents. Space quality refers to the environmental conditions and material quality of public space, such as the smoothness of the ground and the integrity of facilities. High-quality space provides residents with a safe and comfortable environment for activities; Landscape style includes the beauty and diversity of landscape design and the control of the overall environment style. Beautiful landscape style enhances the community beauty and enhances the cultural atmosphere; Use and maintenance reflects the cleanliness of public areas and the maintenance of facilities, and good maintenance ensures the long-term use value of public space. Overall, the improvement of environmental quality can create a more comfortable, beautiful and sustainable public space environment for residents.

(3) Intelligent service: Intelligent service is an important development direction of modern community public space, reflecting the scientific and technological level and management efficiency of the community. Service quality reflects the professionalism of community management services related to public space and residents' satisfaction; The management mechanism involves the intelligent management mechanism and mode related to the public space. The advanced management mechanism can improve the management efficiency of the community; Resident participation Measures the level of resident participation in community management and service improvement. The improvement of intelligent services can not only enhance the management capacity of the community, but also enhance the sense of participation and satisfaction of residents, and promote the sustainable

development of the community.

(4) Humanistic spirit: Humanistic spirit is the soul of a complete community public space, reflecting the cultural connotation of the community and the spiritual needs of residents. Demand satisfaction measures whether public space can meet residents' needs for human life, such as providing convenient facilities and service functions; The living scene reflects the promotion and creation of public space for residents' daily life scenes, collective memory and living habits, and creates a space with life atmosphere to enhance residents' sense of community identity. Neighborhood interaction reflects the promotion of public space to neighborhood relations and group communication activities, and good neighborhood interaction can enhance the cohesion and vitality of the community. Through the shaping of humanistic spirit, public space can become the paradise of residents' spiritual life and promote the prosperity and development of community culture.

(5) Spatial Aging Adaptability for aging: Spatial aging adaptability is an important consideration for the special needs of the elderly, to ensure that public space can provide a safe, comfortable and convenient use environment for the elderly. Safety involves the security of the space and the provision of related safety facilities, such as non-slip cloth strips, handrails, etc., to reduce the risk of accidents during the use of the elderly; Comfort refers to the use of space comfort, such as temperature, humidity, light and other related facilities have an impact on the comfort of the elderly; Accessibility measures the accessibility of community facilities to older people, including barrier-free facilities. Good age-appropriate space design can improve the quality of life of the elderly and enhance their willingness to participate in community activities.

### 3.3 Establishment and Analysis of Index Weights

#### 3.3.1 Construction Process of Evaluation Index System

The community evaluation index system constructed in this study adopts a three-level hierarchical structure and contains 20 evaluation index elements, which belongs to a typical multi-attribute decision making problem. In the multi-attribute evaluation system, there are

significant differences in the degree of influence of each index on decision-making, so it is of great theoretical significance and practical value to determine the weight allocation of each index by scientific method. Based on this, the Analytic Hierarchy Process (AHP) is chosen as the method to determine the index weight.

As a systematic and hierarchical analysis method, analytic hierarchy Process (AHP) is especially suitable for dealing with complex multi-criteria decision problems. In this method, the decision problem is decomposed into objective layer, criterion layer and index layer, and the hierarchical analysis model with internal logic relationship is constructed. The relative weight of each index can be determined effectively through pairwise comparison between and within each level in the model. The advantage of AHP method is that it can transform the qualitative judgment of decision makers into quantitative analysis, and realize the organic combination of qualitative analysis and quantitative calculation by establishing mathematical models, and finally transform complex problems into ranking problems of relative importance among indicators.

The weight determination process of analytic hierarchy process mainly includes the following four steps: First, the hierarchical structure model is constructed, and the hierarchical system including target layer, criterion layer and scheme layer is established according to the logical relationship between indicators; Secondly, the judgment matrix is constructed, and the 1-9 scale method is used to compare the evaluation factors in pairwise order to determine the relative importance of each evaluation factor. Thirdly, the weight vector of each level element to the decision level is calculated. Finally, the consistency test formula is used to test the weights of the elements of the scheme layer to ensure the logical consistency of the weights of each index. Through this systematic analysis process, it can effectively ensure the scientific and rational allocation of index weights.

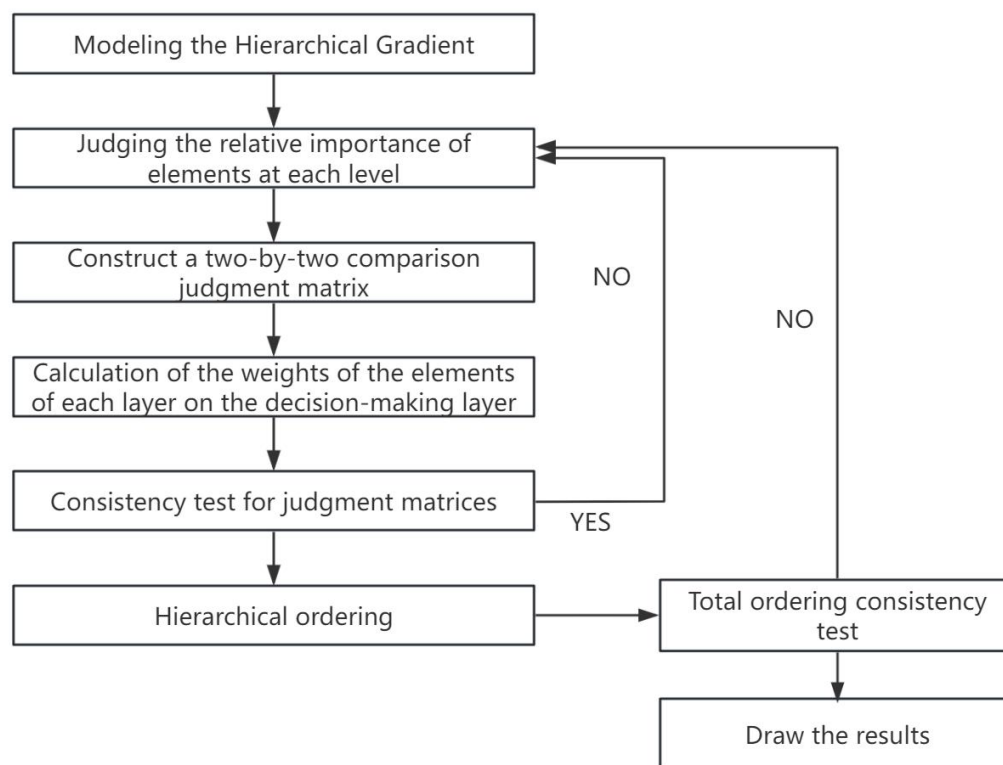


Figure 3- 5 Schematic Diagram of the AHP Process

(Source: author's drawing)

### 3.3.2 Indicator Weight Calculation

Based on the population of evaluation participants identified above, the corresponding evaluators were selected to assess the selected indicators. Questionnaires were distributed to relevant experts in the research field, leaders of Community Resident Committees, community staff, and corporate collaborators involved in renewal activities, and a total of 12 valid questionnaires were returned.

According to the results of the expert questionnaire survey, SPSS software was used to test the consistency of the judgment matrix and calculate the weights of the indicators at all levels in the evaluation index system of Complete community public space according to the weight calculation steps of the hierarchical analysis method, and then the weight calculation results of the questionnaire surveys were weighted and averaged to obtain the final weight values of the indicators at all levels. Among them, the judgment matrix and weight calculation results of the indicators at the criterion level are shown in Table 3-4, and the weight calculation results at the indicator level are shown in Tables 3-5 to 3-9.

Table 3- 4 Criteria Layer Indicator Judgment Matrix and Weight Calculation Results

Criteria Layer Indicator	Spatial Layout	Environmental Quality	Spatial Aging Adaptability	Intelligent Services	Humanistic Spirit	Wi
Spatial Layout	1	1.2	1.5	1.8	2.0	0.2436
Environmental Quality	0.8333	1	1.3	1.5	1.7	0.2185
Spatial Aging Adaptability	0.6667	0.7692	1	1.2	1.4	0.1982
Intelligent Services	0.5556	0.6667	0.8333	1	1.2	0.1764
Humanistic Spirit	0.5	0.5882	0.7143	0.8333	1	0.1633

(Source: drawn by author)

Table 3- 5 The Judgment Matrix and Weight Calculation Results of the Indicator Layer under Spatial Layout

Criteria Layer Indicator	Spatial Accessibility	Completeness and Recognizability of Spatial Functions	Spatial Form	Wi
Spatial Accessibility	1	1.1	1.4	0.3764
Completeness and Recognizability of Spatial Functions	0.9091	1	1.3	0.2185
Spatial Form	0.7143	0.7692	1	0.1982

(Source: drawn by author)

Table 3- 6 The Judgment Matrix and Weight Calculation Results of the Indicator Layer under Environmental Quality

Criteria Layer Indicator	Spatial Quality	Landscape Aesthetics	Usage and Maintenance	Wi
Spatial Quality	1	1.1	1.2	0.3522
Landscape Aesthetics	0.9091	1	1.3	0.3348
Usage and Maintenance	0.8333	0.9091	1	0.3130

(Source: drawn by author)

Table 3- 7 The Judgment Matrix and Weight Calculation Results of the Indicator Layer under Intelligent Service

Criteria Layer Indicator	Service Quality	Management Mechanism	Resident Participation	Wi
Service Quality	1	1.2	1.5	0.3876
Management Mechanism	0.8333	1	1.3	0.3429
Resident Participation	0.6667	0.7692	1	0.2695

(Source: drawn by author)

Table 3- 8 The Judgment Matrix and Weight Calculation Results of the Indicator Layer under Humanistic Spirit



Criteria Layer Indicator	Demand Satisfaction	Living Scene	Neighborhood Interaction	Wi
Demand Satisfaction	1	1.1	1.3	0.3653
Living Scene	0.9091	1	1.2	0.3352
Neighborhood Interaction	0.7692	0.7692	1	0.2995

(Source: drawn by author)

Table 3- 9 The Judgment Matrix and Weight Calculation Results of the Indicator Layer under Spatial Aging Adaptability

Criteria Layer Indicator	Safety	Comfort	Accessibility	Wi
Safety	1	1.3	1.6	0.4017
Comfort	0.7692	1	1.3	0.3265
Accessibility	0.625	0.7692	1	0.2718

(Source: drawn by author)

According to the requirements of analytic hierarchy process, the weight of each index is tested for consistency, and all judgment matrices pass the consistency test ( $CR < 1$ ). The calculated single weight value of each indicator is summarized, and the combined weight value of each indicator is calculated, and the combined weight value is the product of the single weight value of the indicator and its corresponding upper level indicators, that is, the combined weight is the product of the single weight of the indicator of the indicator layer and the weight of the indicator of the criterion layer. Finally, the weight distribution table of public space evaluation indicators in old communities under the concept of complete community was obtained (Table 3-10).

Table 3- 10 Weight Distribution Table of Evaluation Indicators of Public Space in Old Communities under the Concept of Complete Community

Criteria Layer	Indicator Layer	Single Weight (Wi)	Combined Weight
Spatial Layout	Spatial Accessibility	0.3764	0.0917
	Completeness and Recognizability of Spatial Functions	0.3451	0.0840
	Spatial Form	0.2785	0.0678
Environmental Quality	Spatial Quality	0.3522	0.0769
	Landscape Aesthetics	0.3348	0.0731
	Usage and Maintenance	0.3130	0.0684
Intelligent Services	Service Quality	0.3653	0.0597
	Management Mechanism	0.3352	0.0547
	Resident Participation	0.2995	0.0489
Humanistic	Demand Satisfaction	0.4017	0.0796

Criteria Layer	Indicator Layer	Single Weight (Wi)	Combined Weight
<b>Spirit</b>	Living Scene	0.3265	0.0647
	Neighborhood Interaction	0.2718	0.0539
<b>Spatial Aging Adaptability</b>	Safety	0.3876	0.0539
	Comfort	0.3429	0.0605
	Accessibility	0.2695	0.0475

(Source: drawn by author)

### 3.3.3 Indicator Weight Analysis

The previous study constructed a community public space evaluation system containing 5 secondary indicators and 15 tertiary indicators through the AHP hierarchical analysis method, and calculated the weight value of each indicator through expert scoring. The overall weight distribution presents two characteristics: hierarchical balance and demand-oriented. The weight gap of the second-level indicators is controlled between 0.04 and 0.08, which not only avoids over-concentration of weights, but also highlights the importance of core dimensions. For example, “Spatial Layout” (0.2436) and “Environmental Quality” (0.2185) dominate as functional dimensions, while “Spatial Aging Adaptability” (0.1982) and “Intelligence Services” (0.1764) reflect the needs of the elderly for safety and management efficiency. Among the three-level indicators, the combination of “Spatial Accessibility” (0.0917) and “Safety” (0.0796) has the highest weight, which directly reflects the urgent needs of the elderly for accessibility and safety due to the decline of their physiological functions. In addition, the high weights of “spatial quality” (0.0769) and “service quality” (0.0684) indicate that the comfort of the environment and the professionalism of the service have a key impact on the quality of life of the elderly.

This chapter analyzes the weight distribution characteristics of community public space evaluation indicators and their internal logic through the construction and calculation of the weight system. It is found that Spatial Layout and Environmental Quality are the core dimensions of functional optimization, while Spatial Aging Adaptability and Intelligence Services are the key handles to improve the quality of life of the elderly. The weighting results provide a quantitative basis for the scenario-based renewal of public space in Dual-aged communities, and the subsequent study will further verify the applicability of the weighting

system and propose spatial renewal strategies by combining specific cases.

## 3.4 Comprehensive Evaluation

### 3.4.1 Comprehensive Evaluation Method

The complete community evaluation index system contains a variety of indicators, different indicators can not be directly added and integrated due to different units, so a comprehensive evaluation method should be selected to achieve the integration between different indicators. In this paper, fuzzy comprehensive evaluation method (FCE) is used to evaluate the target community.

Fuzzy comprehensive evaluation method is a comprehensive evaluation method based on fuzzy mathematics theory, its core is to use membership function to transform qualitative evaluation into quantitative analysis, especially for dealing with subjective problems that are difficult to quantify accurately. In order to improve the scientificity and reliability of the evaluation results, the fuzzy comprehensive evaluation method is usually combined with the analytic hierarchy method, and a more objective comprehensive evaluation conclusion is formed by integrating the judgment results of many experts and scholars. The implementation process of fuzzy comprehensive evaluation method mainly includes the following steps: First, build a multi-level evaluation index system, and clarify the logical relationship between indicators at each level; Secondly, the analytic hierarchy process (AHP) and Delphi method are used to determine the weight of each evaluation index, and the weight vector is constructed. Thirdly, according to the index quantification standard, combined with the hierarchical relationship and the score range, the evaluation grade theory domain is established, and the corresponding evaluation matrix is constructed. Finally, the evaluation matrix and weight vector are integrated by fuzzy synthesis operation, and the comprehensive score of each level index is obtained. By combining fuzzy mathematics theory with hierarchical analysis, this method effectively solves the problem that the qualitative index is difficult to quantify in complex systems, and provides scientific basis for multi-attribute decision making. At the same time, in view of the specific old communities involved in this

paper and the reference in the previous case analysis, the evaluation and comparison of multiple projects can be timely added in the final step of the comprehensive evaluation to provide reference for the subsequent community renewal design part of this study.

### 3.4.2 Description of Quantitative Scoring Criteria

This paper uses the method of scoring to classify and score each index layer index involved in the evaluation of community public space under the concept of complete community, and the score of each single index is 100 points, and explains and explains each index. The following table provides a detailed description of each indicator. The result of the score is judged according to the interval. 100-80 is complete, 80-60 is more complete, 60-40 is qualified, 40-20 is poor, and less than 20 is lacking. The specific score of each index is obtained by quantification standard, and the final score of this item is multiplied by percentage and full score.

Table 3- 11 Evaluation results grading table

Level Score	Complete [80-100]	Fairly Complete [60-80]	Qualified [40-60]	Poor [20-40]	Lack Below 20
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(Source: drawn by author)

#### 3.4.2.1 Spatial Layout Evaluation

Table 3- 12 Spatial Layout Index Layer Index Decision Table

Indicator Layer	Criteria for Indicator Determination	Quantification Method
<b>Spatial Accessibility</b>	Walking distance, path connectivity, etc., measured through field surveys or community floor plans	<p><b>[80-100]:</b> Walking distance <math>\leq 3</math> minutes, no dead-end roads↓</p> <p><b>[60-80]:</b> Walking distance 3-5 minutes, dead-end roads <math>\leq 10\%</math>↓</p> <p><b>[40-60]:</b> Walking distance 5-10 minutes, dead-end roads 11%-30%↓</p> <p><b>[20-40]:</b> Walking distance 10-15 minutes, dead-end roads 31%-50%↓</p> <p><b>Below 20:</b> Walking distance <math>&gt; 15</math> minutes, dead-end roads <math>&gt; 50\%</math></p>
<b>Completeness and Recognizability of Spatial Functions</b>	Functional diversity, facility completeness, facility integrity rate, functional area signage coverage, etc., measured through field surveys and literature review	<p><b>[80-100]:</b> Facility types <math>\geq 8</math>, facilities per 1,000 people <math>\geq 10</math>, integrity rate <math>\geq 90\%</math>, signage coverage <math>\geq 90\%</math>↓</p> <p><b>[60-80]:</b> Facility types 6-7, facilities per 1,000 people 8-9, integrity rate 70%-89%, signage coverage 70%-89%↓</p> <p><b>[40-60]:</b> Facility types 4-5, facilities per 1,000 people 6-7, integrity rate 50%-69%, signage coverage 50%-69%↓</p> <p><b>[20-40]:</b> Facility types 2-3, facilities per 1,000 people</p>

Indicator Layer	Criteria for Indicator Determination	Quantification Method
		4-5, integrity rate 30%-49%, signage coverage 30%-49%↓ <b>Below 20:</b> Facility types $\leq 1$ , facilities per 1,000 people $< 4$ , integrity rate $< 30\%$ , signage coverage $< 30\%$
<b>Spatial Form</b>	Spatial area, layout rationality, spatial occupancy impact, etc., measured through online map platforms or ArcGIS software and design drawings	<b>[80-100]:</b> Spatial area $\geq 2.0$ m <sup>2</sup> /person, strict zoning, no spatial occupancy impact↓ <b>[60-80]:</b> Spatial area 1.5-1.9 m <sup>2</sup> /person, basic zoning, slight spatial occupancy impact↓ <b>[40-60]:</b> Spatial area 1.0-1.4 m <sup>2</sup> /person, vague zoning, moderate spatial occupancy impact↓ <b>[20-40]:</b> Spatial area 0.5-0.9 m <sup>2</sup> /person, no zoning, severe spatial occupancy impact↓ <b>Below 20:</b> Spatial area $< 0.5$ m <sup>2</sup> /person, complete chaos, total spatial occupancy impact

(Source: drawn by author)

In the evaluation system of community public space, spatial layout, as the second-level index with the highest weight, directly determines the convenience and efficiency of elderly people's use of public space. Among them, spatial accessibility is the primary condition for the elderly to use public space, and its weight is the highest among the three indexes in the system. Therefore, considering the activity characteristics of the users of the old community space, this paper chooses walking distance and path continuity as the core evaluation dimension. Walking distance reflects the time cost of the elderly from the residential area to the public space, while path continuity evaluates the continuity and safety of the walking path. In the quantification criteria, walking distance was divided into five grades:  $\leq 5$  minutes (excellent) to  $> 20$  minutes (poor), and path continuity was determined by the proportion of broken roads. This design fully considers the needs of the elderly for short distance and barrier-free passage due to physiological decline, and also avoids detour or safety risks caused by unreasonable path design.

The diversity and recognizability of spatial functions are key factors to enhance the experience of the elderly. This paper evaluates it from three aspects: functional diversity, facility completeness and signage system. Functional diversity is quantified by counting the types of facilities in the public space (such as seats, fitness equipment, green areas, etc.), facility completeness is evaluated by combining the number of facilities and the proportion of community population, and the quantification of the sign system is realized by the coverage

of functional area signs. The evaluation method under this index not only focuses on the number and type of facilities, but also emphasizes the auxiliary role of the sign system on the spatial cognition of the elderly, especially for the elderly group with cognitive decline.

The rationality of space form directly affects the efficiency and comfort of public space. This paper selects three dimensions of space area, layout rationality and space occupation impact as its evaluation system, aiming to ensure that public space can not only meet the activity needs of the elderly, but also avoid the function loss caused by space occupation. The space area is quantified by the per capita public space area ( $\text{m}^2/\text{person}$ ), and the rationality of the layout is determined by the clarity of the functional zoning. In addition, the impact of space occupancy assessed the use of public space by temporary construction, clutter, and parking.

### 3.4.2.2 Environmental Quality Evaluation

Table 3- 13 Environmental Quality Index Layer Index Decision Table

Indicator Layer	Criteria for Indicator Determination	Quantification Method
<b>Spatial Quality</b>	Spatial pleasantness, spatial completeness (proportion of missing functional areas), spatial quality, etc., obtained through resident satisfaction surveys and interviews	<b>[80-100]:</b> Spatial pleasantness >90%, missing functional areas <10%, spatial quality >90%↓ <b>[60-80]:</b> Spatial pleasantness 70%-89%, missing functional areas 11%-30%, spatial quality 70%-89%↓ <b>[40-60]:</b> Spatial pleasantness 50%-69%, missing functional areas 31%-50%, spatial quality 50%-69%↓ <b>[20-40]:</b> Spatial pleasantness 30%-49%, missing functional areas 51%-70%, spatial quality 30%-49%↓ <b>Below 20:</b> Spatial pleasantness <30%, missing functional areas >70%, spatial quality <30%↓
<b>Landscape Aesthetics</b>	Greening rate, landscape diversity, aesthetics, etc., measured through field surveys and data review	<b>[80-100]:</b> Greening rate >70%, landscape diversity >5 types, aesthetics >90%↓ <b>[60-80]:</b> Greening rate 50%-69%, landscape diversity 4 types, aesthetics 70%-89%↓ <b>[40-60]:</b> Greening rate 30%-49%, landscape diversity 3 types, aesthetics 50%-69%↓ <b>[20-40]:</b> Greening rate 10%-29%, landscape diversity 2 types, aesthetics 30%-49%↓ <b>Below 20:</b> Greening rate <10%, landscape diversity <1 type, aesthetics <30%↓
<b>Usage and Maintenance</b>	Facility integrity, maintenance frequency, etc., measured through community management records and field surveys	<b>[80-100]:</b> Facility integrity >90%, maintenance frequency >4 times/month↓ <b>[60-80]:</b> Facility integrity 70%-89%, maintenance frequency 3 times/month↓ <b>[40-60]:</b> Facility integrity 50%-69%, maintenance frequency 2 times/month↓ <b>[20-40]:</b> Facility integrity 30%-49%, maintenance frequency 1 time/month↓ <b>Below 20:</b> Facility integrity <30%, maintenance

Indicator Layer	Criteria for Indicator Determination	Quantification Method
		frequency <1 time/month

(Source: drawn by author)

In the evaluation system of community public space, environmental quality, as the second most weighted secondary index, directly affects the elderly's experience of using public space and psychological feelings. Spatial quality is the core dimension of environmental quality, and its evaluation is mainly carried out from three aspects: spatial amenity, spatial integrity and spatial quality. The spatial amenity is quantified by the residents' satisfaction survey, which reflects the amenity of the space in the aspects of applicability. Spatial integrity reflects the completeness of spatial function by evaluating the proportion of missing functional areas. The spatial quality is quantified through the survey of residents' satisfaction with construction and design.

Landscape style is an important dimension to enhance the aesthetic value and ecological benefit of community public space. Therefore, the selection of indicators should not only pay attention to the ecological quality and function of landscape, but also emphasize the positive impact of its aesthetic value on the mental health of the elderly. This paper evaluates from three aspects: greening rate, landscape diversity and aesthetics. The greening rate is quantified by the proportion of the green area to the total public space, the landscape diversity is measured by the types of landscape elements (such as trees, shrubs, flowers, etc.), and the aesthetics is quantified by the survey of residents' satisfaction.

Use and maintenance is a key dimension to ensure the long-term availability of public space. The selection of evaluation criteria aims to ensure that facilities in public space are functionally intact and maintained in a timely manner, and avoid the factors affecting the decline in space utilization caused by facility damage or insufficient maintenance. Therefore, the evaluation is conducted from two aspects: facility integrity and maintenance frequency. Facility integrity is quantified by the proportion of common facilities (such as seats, fitness equipment, etc.) in good condition, and maintenance frequency is assessed by the number of monthly maintenance.

### 3.4.2.3 Intelligent Service Evaluation

Table 3- 14 Intelligent Service Indicator Layer Indicator Determination Table

Indicator Layer	Criteria for Indicator Determination	Quantification Method
Service Quality	Service response speed, service professionalism, resident satisfaction, etc., obtained through field surveys, interviews, and literature review	<p><b>[80-100]</b>: Fast service response, high service professionalism, high resident satisfaction</p> <p><b>[60-80]</b>: Relatively fast service response, relatively high service professionalism, relatively high resident satisfaction</p> <p><b>[40-60]</b>: Average service response, average service professionalism, moderate resident satisfaction</p> <p><b>[20-40]</b>: Slow service response, low service professionalism, low resident satisfaction</p> <p><b>Below 20</b>: Slow service response, poor service professionalism, low resident satisfaction</p>
Management Mechanism	Information management level, management efficiency, etc., measured through field surveys and resident satisfaction surveys	<p><b>[80-100]</b>: Complete and well-developed information level, high management efficiency</p> <p><b>[60-80]</b>: Relatively high information level, relatively high management efficiency</p> <p><b>[40-60]</b>: Average information level, moderate management efficiency</p> <p><b>[20-40]</b>: Low information level, low management efficiency</p> <p><b>Below 20</b>: No intelligent information service platform</p>
Resident Participation	Diversity of participation channels (types), participation frequency, etc., measured through community management records and field surveys	<p><b>[80-100]</b>: Participation channels <math>\geq 4</math> types, participation frequency <math>\geq 3</math> times/month, resident satisfaction <math>&gt;90\%</math></p> <p><b>[60-80]</b>: Participation channels 3 types, participation frequency 2 times/month, resident satisfaction 70%-89%</p> <p><b>[40-60]</b>: Participation channels 2 types, participation frequency 1 time/month, resident satisfaction 50%-69%</p> <p><b>[20-40]</b>: Participation channels 1 type, participation frequency 0.5 times/month, resident satisfaction 30%-49%</p> <p><b>Below 20</b>: Lack of participation channels, participation frequency <math>&lt;0.5</math> times/month, resident satisfaction <math>&lt;30\%</math></p>

(Source: drawn by author)

The content under the index of intelligent service is quantitatively evaluated from the three dimensions of "service quality", "management mechanism" and "residents' participation", which is directly related to the efficiency of community management and the convenience of residents' life. Service quality is the core dimension of intelligent service, and its evaluation mainly starts from service response speed and service professionalism. Service response speed reflects the timeliness of community service through the quantitative



evaluation of the time from residents' demand to service response. Service professionalism is assessed by the coverage of professional qualifications of service organizations and personnel.

The management mechanism pays attention to the technical ability of the management system, and emphasizes the role of residents' participation in promoting management efficiency, and evaluates from three aspects: management informatization level, management efficiency and residents' participation. The level of management informatization is quantified by the coverage rate of information service functions in the community management system, the management efficiency is evaluated by the average time of problem solving, and the resident participation is quantified by the proportion of residents participating in community management.

The emphasis on residents' participation can promote residents' active participation in community governance and enhance the sense of community belonging. Therefore, we choose to evaluate from three aspects: diversity of participation channels, frequency of participation and residents' satisfaction. The diversity of participation channels is quantified by the types of channels that residents participate in community management (such as online platforms, offline meetings, etc.), the frequency of participation is evaluated by the average number of residents participating in community management per month, and the satisfaction of residents is quantified by the survey of residents' satisfaction.

#### 3.4.2.4 Humanistic Spirit Evaluation

Table 3- 15 Humanistic Spirit Index Layer Index Decision Table

Indicator Layer	Criteria for Indicator Determination	Quantification Method
<b>Demand Satisfaction</b>	Cultural diversity (types of activities), adaptability (match rate), resident satisfaction, etc., obtained through field surveys, community activity records, and literature review	<p><b>[80-100]</b>: Types of activities <math>\geq 8</math>, adaptability <math>\geq 90\%</math>, resident satisfaction <math>\geq 90\%</math></p> <p><b>[60-80]</b>: Types of activities 6-7, adaptability 70%-89%, resident satisfaction 70%-89%</p> <p><b>[40-60]</b>: Types of activities 4-5, adaptability 50%-69%, resident satisfaction 50%-69%</p> <p><b>[20-40]</b>: Types of activities 2-3, adaptability 30%-49%, resident satisfaction 30%-49%</p> <p><b>Below 20</b>: Types of activities <math>\leq 1</math>, adaptability <math>&lt; 30\%</math>, resident satisfaction <math>&lt; 30\%</math></p>
<b>Living Scene</b>	Activity richness (times/month), scenario adaptability (match rate), resident participation, etc.,	<b>[80-100]</b> : Activity richness $\geq 4$ times/month, scenario adaptability $\geq 90\%$ , resident participation $\geq 90\%$

Indicator Layer	Criteria for Indicator Determination	Quantification Method
	measured through field surveys and resident satisfaction surveys	<p><b>[60-80]:</b> Activity richness 3 times/month, scenario adaptability 70%-89%, resident participation 70%-89%</p> <p><b>[40-60]:</b> Activity richness 2 times/month, scenario adaptability 50%-69%, resident participation 50%-69%</p> <p><b>[20-40]:</b> Activity richness 1 time/month, scenario adaptability 30%-49%, resident participation 30%-49%</p> <p><b>Below 20:</b> Activity richness &lt;1 time/month, scenario adaptability &lt;30%, resident participation &lt;30%</p>
<b>Neighborhood Interaction</b>	Quality of interaction spaces, interaction frequency, resident satisfaction, etc., measured through questionnaires and field surveys	<p><b>[80-100]:</b> Quality of interaction spaces complete, interaction frequency <math>\geq 3</math> times/week, resident satisfaction <math>\geq 90\%</math></p> <p><b>[60-80]:</b> Quality of interaction spaces good, interaction frequency 2 times/week, resident satisfaction 70%-89%</p> <p><b>[40-60]:</b> Quality of interaction spaces acceptable, interaction frequency 1 time/week, resident satisfaction 50%-69%</p> <p><b>[20-40]:</b> Quality of interaction spaces average, interaction frequency 0.5 times/week, resident satisfaction 30%-49%</p> <p><b>Below 20:</b> Quality of interaction spaces poor, interaction frequency &lt;0.5 times/week, resident satisfaction &lt;30%</p>

(Source: drawn by author)

Although the secondary index of humanistic spirit is relatively low in the weight calculation above, its role in enhancing community cohesion and promoting residents' happiness cannot be ignored. Demand satisfaction is the core dimension of humanistic spirit, and its evaluation is mainly carried out from three aspects: humanistic diversity, adaptability and residents' satisfaction. It fully considers the needs of the elderly for diversified cultural activities, and also provides quantitative basis for the optimization of community cultural activities. The cultural diversity is quantified by the number of cultural activities (such as reading clubs, chess and card activities, convenience services, etc.) provided in the public space, reflecting the richness of community cultural activities; Adaptability is assessed by the matching degree between cultural activities and the needs of the elderly, reflecting the pertinence and compatibility of activity design; The residents' satisfaction is quantified through the residents' satisfaction survey, which directly reflects the residents' recognition of cultural activities.

Life scene not only focuses on the quantity and quality of activity scenes, but also emphasizes the role of residents' participation in promoting community vitality. It is evaluated from three aspects: activity richness, scene adaptability and residents' participation. Activity richness was quantified by the number of community activities organized each month (times/month), scene adaptability was evaluated by the matching degree between activity scenes and the living habits of the elderly, and resident participation was quantified by the proportion of residents participating in activities.

Neighborhood interaction promotes daily communication among residents and enhances the sense of community belonging, which is also a key dimension to enhance community cohesion. Therefore, it is selected to evaluate from three aspects: the quality of communication space, interaction frequency and residents' satisfaction. The quality of the interaction space is quantified by the coverage of the interaction space (such as leisure seats, pavilions, etc.), the interaction frequency is evaluated by the average number of times per week that residents participate in the neighborhood interaction (times/week), and the satisfaction of residents is quantified by the satisfaction survey of residents.

#### 3.4.2.5 Spatial Aging Adaptability Evaluation

Table 3- 16 Spatial Aging Adaptability Index Layer Index Determination Table

Indicator Layer	Criteria for Indicator Determination	Quantification Method
<b>Safety</b>	Facility coverage, emergency call device coverage, etc., obtained through field surveys and literature review	<p><b>[80-100]</b>: Facility coverage &gt;90%, emergency call devices <math>\geq 3</math>↓</p> <p><b>[60-80]</b>: Facility coverage 70%-89%, emergency call devices 2↓</p> <p><b>[40-60]</b>: Facility coverage 50%-69%, emergency call devices 1↓</p> <p><b>[20-40]</b>: Facility coverage 30%-49%, no emergency call devices↓</p> <p><b>Below 20</b>: Facility coverage &lt;30%, no emergency call devices↓</p>
<b>Comfort</b>	Usability suitability, control of adverse factors, etc., measured through field surveys and resident satisfaction surveys	<p><b>[80-100]</b>: Usability suitability &gt;90%, control of adverse factors &gt;90%↓</p> <p><b>[60-80]</b>: Usability suitability 70%-89%, control of adverse factors 70%-89%↓</p> <p><b>[40-60]</b>: Usability suitability 50%-69%, control of adverse factors 50%-69%↓</p> <p><b>[20-40]</b>: Usability suitability 30%-49%, control of adverse factors 30%-49%↓</p> <p><b>Below 20</b>: Usability suitability &lt;30%, control of adverse factors &lt;30%↓</p>

Indicator Layer	Criteria for Indicator Determination	Quantification Method
Accessibility	Integrity of barrier-free facilities, path accessibility, etc., measured through community management records and field surveys	<b>[80-100]:</b> Integrity of barrier-free facilities >90%, obstacle frequency $\leq 1$ per 100m↓ <b>[60-80]:</b> Integrity of barrier-free facilities 70%-89%, obstacle frequency 2 per 100m↓ <b>[40-60]:</b> Integrity of barrier-free facilities 50%-69%, obstacle frequency 3 per 100m↓ <b>[20-40]:</b> Integrity of barrier-free facilities 30%-49%, obstacle frequency 4 per 100m↓ <b>Below 20:</b> Integrity of barrier-free facilities <30%, obstacle frequency >5 per 100m↓

(Source: drawn by author)

In the evaluation system of community public space, the reasonable evaluation of Spatial Aging Adaptability is directly related to the safety, comfort and convenience of the elderly using public space. This paper quantitatively evaluates Spatial Aging Adaptability from the dimensions of “Safety”, “Comfort” and “Accessibility”, aiming to provide a scientific basis for the adaptive transformation of community public space. The purpose is to provide a scientific basis for the ageing transformation of community public spaces. Safety is the core dimension of Spatial Aging Adaptability, and its evaluation is mainly carried out from two aspects: the coverage rate of facilities and the coverage rate of emergency call equipment. The coverage rate of facilities includes the proportion of anti-skid facilities, handrails and other safety facilities, reflecting the degree of protection for the safety of the elderly in community public spaces in terms of hardware facilities; while the coverage rate of emergency call equipment is quantified by the density of equipment, i.e., the number of emergency call equipment in the main spaces within the community, which reflects the completeness of the emergency facilities.

Comfort is an important dimension to enhance the elderly's experience, focusing on the quality of the physical environment of the space and the psychological needs of the elderly for a healthy environment, and evaluated in terms of appropriateness of use and control of unfavorable factors. Suitability for use is quantified through resident satisfaction surveys, reflecting the comfort provided by the Spatial Aging Adaptability design level, while control of disadvantages is quantified through resident satisfaction surveys on the control effect of disadvantages such as terrain and spatial obstruction.

Accessibility is a key dimension to guarantee the convenient use of public space for the elderly, ensuring that the elderly can reach and use the public space without obstacles, and avoiding the inconvenience of using the space due to damage to the facilities or obstacles in the path, which is assessed in terms of the integrity of the accessibility facilities and the accessibility of the path. Accessibility integrity is quantified by the intactness of accessible facilities (e.g., ramps, elevators), while path accessibility is assessed by the frequency of path interruptions (times/100m) or the presence of obstacles.

### 3.5 Summary of This Chapter

With the concept of complete community as the theoretical framework, this chapter systematically constructs the public space evaluation system of the old community, aiming to provide a scientific and operable evaluation tool for the scene-oriented updating of the public space of the double old community. Through theoretical combing and practical demand analysis, the logical starting point and core objectives of the evaluation system are clarified, and the method of combining analytic hierarchy process and fuzzy comprehensive evaluation is adopted to achieve quantitative integration and dynamic adaptation of multi-level indicators.

In terms of the construction of the evaluation index system, this chapter starts from the three dimensions of the whole community, combines the relevant national and local policy standards and relevant research literature, determines five criterion-level indicators and 15 indication-level indicators, and explains and quantifies each indicator in detail. Further, the analytic hierarchy process is used to determine the weights of each index to ensure the scientific and rational distribution of weights.

Secondly, using the fuzzy comprehensive evaluation method, combined with the evaluation index system and weights, the community public space is quantitatively scored, which solves the problem of multi-index and multi-factor comprehensive evaluation, and provides scientific decision support for the renewal of community public space. In summary, the results of this chapter provide methodological support for subsequent empirical research.

## Chapter 4 Investigation and Comprehensive Evaluation of Public Space Status of Shigang Community in Guangzhou

This chapter focuses on the current situation research and comprehensive evaluation of the public space in Shigang community in Guangzhou, aiming to reveal the current situation characteristics and core issues of the community public space through the combination of systematic research and the previous evaluation methods. The structure of the chapter follows the logical framework of “research plan-implementation of research-evaluation and application”, and is mainly divided into three parts: community overview and development, research methodology and technical route, and current situation research and comprehensive evaluation.

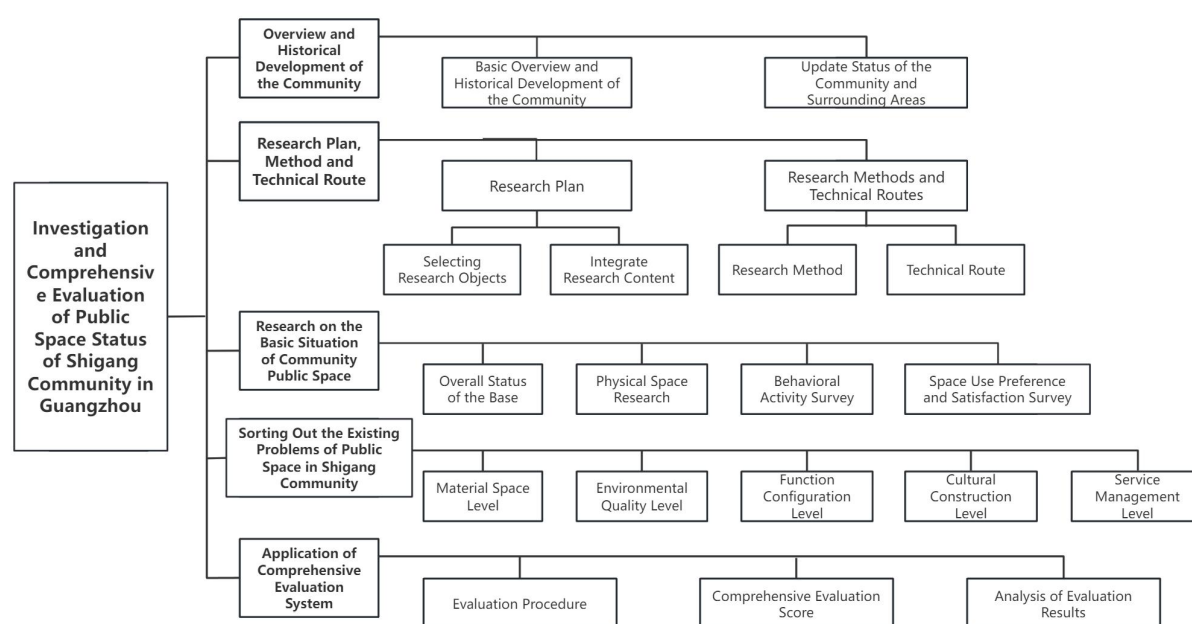


Figure 4- 1 Chapter IV Chapter Structure Framework Chart

(Source: author's drawing)

This chapter systematically develops the research content through the logical framework of “research - evaluation - problem solving”. The first part of the study starts from the overview and historical development of the community, and summarizes the basic situation and renewal background of Shigang Community as a typical Dual-aged community. The second part of the study combines field research and questionnaire surveys to

comprehensively analyze the physical space, behavioral activities, usage preferences and satisfaction of the community public space, which provides detailed data support for the subsequent evaluation. Finally, the evaluation system of Complete community public space constructed in the previous section is applied to quantitatively rate the public space of the community, accurately identify the strengths and weaknesses of the community public space, and clearly prioritize the renewal, which lays a solid foundation for realizing the comprehensive renewal of the community public space.

## 4.1 Overview and Historical Development of the Community

### 4.1.1 Basic Overview and Historical Development of the Community

Shigang community is a community under the jurisdiction of South Stone Street, Haizhu District, Guangzhou City, Guangdong Province, surrounded by Shaxi community, Quantang community, Xiaoyanwan community, Paper North community and other new and old residential areas, the community is currently under the jurisdiction of the population of about 9,000 people, this paper focuses on the research and the application of the design plan later in the paper is mainly for the Shigang compound 34, 60-70 unit dormitory of the surrounding area, the range of about 106,000 square meters, residential buildings Built in 1988. South Stone Street as part of the old city of Haizhu, its geographical location advantages are particularly prominent, the surrounding health care, education, commercial and public facilities and other resources are very rich in the development of local industry and history of the level of the typical era and regional characteristics, the development of the community renewal of the Shigang community development initially as a residential housing development of the employees of factories and enterprises, after several decades of use and development, and now faces an urgent need for renewal. The development of Shigang community was initially developed as residential housing for employees of factories and enterprises.

Through the actual communication interviews and field research with the resident committee of Shigang community, we obtained the core needs and transformation focuses of

the community: due to the long period of time and the special nature of the community, in addition to the aging and damage of the community's material space, the community is also facing the lack of relevant services and management, and the lack of relevant organizations and departments to intervene and guide the community's actual operation; and due to the community's elderly population, the difficult population, the widowed elderly, and the community population, the community has a large number of elderly people. And due to the special demographic characteristics of the community, such as the elderly population, people in difficulty, the number of widows and orphans, and the homogeneous demographic structure of the community, the demand for ageing and age-friendly services is particularly urgent.

#### 4.1.2 Renewal Status of the Community and Surrounding Areas

Due to the early construction time and the absence of relevant property and service parties in the community, Shigang Community and its surrounding areas have taken relevant exploration of construction and management in recent years, and achieved remarkable results. Through the construction of "one home, one product" characteristic community, the vitality of the community has been enhanced. In terms of community activities, the community has led the formation of public welfare table tennis teams, strengthened the construction of activity venues and equipment, and invited professionals to guide training and organize competition exchanges. At the same time, we also organized the team members to participate in community public welfare services, such as the elevator installation cooperation meeting, the typhoon "Mangosteen" evacuation, the prevention and control of dengue fever, the removal of stagnant water, and the eradication of evil publicity. In terms of cultural activities, the community has strengthened cooperation with the street culture station and the two kindergartens under its control to build a "neighborhood music" style display and activity platform, and carry out neighborly cultural activities such as community table tennis competition, oral history for the elderly, graffiti on the community cultural wall, art performances, fun sports games, and family talent shows. In terms of the community environment, the community has carried out a series of environmental improvement work, including painting the corridors, installing handrails, re-laying anti-skid bricks, solving water



problems, and planning unified parking spots for electric vehicles and bicycles. In addition, the street also "see the gap inserted green", for residents to build a paradise at the door, such as 651 South East Road has been renovated, equipped with fitness equipment, stone benches, stone tables, and new children's play space; In addition, in recent years, the community has also incorporated the concept of micro-renewal into the renewal activities. As part of the micro-transformation project of the old residential area in Haizhu District, Shigang Community involves facade restoration, adding Lingnan characteristic architectural elements, optimizing the setting of garbage sorting and recycling points, adding children's amusement facilities and residents' fitness paths, etc. Focus on creating the "Guangzhou Optics Factory, South China Medical Equipment Factory History Review" exhibition corridor, let the elderly residents recall the extraordinary years, let the young residents in-depth understanding of the power of example.

## 4.2 Research Plan, Method and Technical Route

### 4.2.1 Research Plan

On the basis of the scope of the project site involved and the selection of plots, the research plan is drawn up to determine the object and basic content of the research. On this basis, the corresponding research methods and technical routes are selected according to the theoretical review and design objectives involved in the topic selection, and the contents of each part are detailed, summarized and summarized. As a typical old unit community under the planned economy system, combined with the current development vision and urban renewal direction, the methodological framework and technical route of this research have a certain degree of universality and practical significance for community renewal activities with similar situations. This survey aims to comprehensively understand the current situation of public space in Shigang community, including spatial distribution, facility functions, use frequency and environmental quality, and systematically analyze the matching degree between space and community residents' activities, so as to provide data support for accurate renewal design. At the same time, based on the current research, the paper sorted out the main

problems existing in the functional configuration, facility maintenance and spatial connectivity of public space, combined with the community characteristics and residents' feedback, proposed feasible improvement directions, laid the foundation for the follow-up strategy formulation, and summarized the theoretical theme of this paper - the framework of community public space research under the guidance of the theory of "complete community".

#### 4.2.1.2 Selecting Research Objects

Based on the realistic path consideration of this urban renewal activity and the existing basic data, the selected scope of this research mainly includes the public space and its surrounding boundary space in the residential community on the north side of Shigang Community, as well as the spatial interface along Shigang Road. The primary objective of the research is the material public space inside the plot, including the open and semi-open space, green space, road interface, space node, etc., and pay attention to the basic conditions in different Spaces.

Both involving space and community and other levels of research, human behavior participation and psychological response can not be ignored. Although the research based solely on technical means and material level can obtain detailed data support, it is also easy to ignore the richness and diversity of human activities, psychological influences and life scenes under the complex and multidimensional issue of community renewal. On the basis of the material space, residents inside the community should be selected as the research object, and the specific content, frequency and psychological expectations of their behavior activities should be statistically investigated.

#### 4.2.1.2 Integrate Research Content

According to the previously determined research objects, according to the habits and logic of systematic research, the main content of this research is divided into three parts: material space research, behavioral activity research and questionnaire interview research, and the corresponding research methods and integration forms are selected for in-depth investigation from three aspects.

## 4.2.2 Research Methods and Technical Routes

Just as the theory of "complete community" involves multiple dimensions, the content of this survey is also relatively comprehensive and detailed and divided into multiple aspects. Therefore, corresponding research methods and technical routes should be selected for different aspects and contents.

### 4.2.2.1 Research Method

#### (1) Physical space research

Physical space research is an important part of the investigation of the status quo of community public space, which involves a detailed investigation of the physical environment of the community, such as spatial layout, facility status, environmental quality and other aspects, including the type and area of space inside the community, transportation network, spatial distribution, connection form, current quality and other material aspects.

For this part of the survey, mainly through the way of field investigation, the status quo of the space inside the site, traffic network, activity venue, landscape and other conditions were investigated, the existing topographic map was corrected, and the base map of the material space was established to provide the basis for the subsequent research results. Comprehensively understand the status quo of community public space, and provide detailed data support and decision-making basis for subsequent community renewal and optimization.

#### (2) Behavioral Activity Research

Behavioral activity research focuses on various behaviors and activities of community residents in public space, which not only reflect the daily life pattern of residents, but also directly reflect the vitality and life scene of the community. To be specific, behavioral activities generally include the following aspects: Activity type and frequency refer to various activities carried out by residents in public space, such as leisure, sports, socializing, etc., as well as the frequency and duration of these activities, which helps to identify the most popular activities in the community and the space with low utilization rate; Activity time model focuses on residents' activity distribution in different time periods, including peak hours and low peak hours, which is of great significance for understanding residents' daily life rhythm

and optimizing space use. The space use model mainly analyzes how residents move and stay in the public space, and identifies the hot and cold spots in the space, as well as the reasons for their formation. Activity environment interaction focuses on the relationship between residents' activities and environmental factors, such as weather, season, lighting, etc., and how environmental design affects the occurrence and experience of activities.

The research on behavior activities can mainly refer to PSPL, the public space-Public life research method proposed by Jan Gale, a Danish urban planner, which aims to provide a basis for the design and transformation of public space by understanding and grasping the characteristics of people's activities and behaviors in public space and combining qualitative and quantitative analysis. In order to create high-quality public space and meet the needs of citizens to carry out public life, the patches in this part of behavioral activity survey mainly refer to research methods such as site counting method, map marking method and tracking record method at the specific methodological level.

On the operational level, based on the community as the basic unit, tracking and observation were carried out respectively for the period of high activity frequency of the elderly (morning and evening), and activity photos were taken and corresponding sketches were drawn. The observation duration was guaranteed to be about 1.5-2 hours. On the specific level, on the one hand, based on the outdoor activity venue, the user group composition, the number of elderly people, the use time, the use time and other contents of each activity venue in the lot are collected. On the other hand, based on the elderly population, the outdoor activity characteristics such as activity type, activity location, activity time and activity duration were observed. In the process of investigation, various forms such as observation, drawing, measurement and shooting can be used to record and interpret, and mapping can be used for map annotation. By observing and predicting Spaces and scenes, useful spatial information can be extracted from complex and chaotic public space life scenes to facilitate the extraction and summary of scene activity types in the later stage.

### (3) Questionnaire Interview Survey

This part of the survey mainly uses questionnaires and open interviews with relevant

community residents, selects various typical public Spaces, explores the internal correlation between public Spaces and activities of the elderly through personal interviews and questionnaires, and supplements the data that cannot be obtained at the stage of physical space survey and behavior survey. Besides, the basic information (age, gender, address, etc.), activity type, activity location, activity time, activity duration, activity frequency and satisfaction with facilities of the interviewed elderly were obtained, and basic information such as travel mode, travel path and travel time were collected.

#### 4.2.2.2 Technical Route

In order to facilitate the orderly development of the research on the public space of the site, based on the selection of research objects, combined with the research content, the research method is selected according to the needs of the research purpose, the research technical route is determined, and the research outline is provided for the follow-up research work.

Table 4- 1 Public Space Research Content

Research Stage		Research Content	Research Method	
Physical Research	Space	Physical space research focuses on the physical environment and structure of the community, which forms the material basis of the community and affects residents' daily life and the overall function of the community, including public spaces and open areas, transportation facilities, landscape and natural elements, infrastructure, etc.	On-site method, marking etc.	observation map method,
Behavioral Research		Behavioral activity research aims to comprehensively understand the behavior patterns and characteristics of community residents in public spaces. This includes recording and analyzing the types and frequency of activities, activity time patterns, and characteristics of the resident groups involved, etc.	On-site method, marking etc.	counting tracking method,
Questionnaire and Interview Research		The purpose of the questionnaire and interview research is to gain an in-depth understanding of community residents' perceptions, usage, and satisfaction with public spaces, mainly involving residents' direct experiences and feedback on the community's physical space layout, facility conditions, environmental quality, safety, accessibility facilities, and frequency and preferences of space usage, etc.	Personal method, questionnaire survey method, etc.	interview

(Source: compiled by the author based on relevant information)

In terms of technical route, in order to ensure the smooth advancement of on-site investigation of outdoor activities, this study designs and determines the technical scheme of

public space investigation based on the clear investigation object, combined with the needs of the investigation content and research objectives, and formulates the corresponding investigation outline to lay a good foundation for the subsequent investigation work. The specific implementation level includes three main departments and stages: material space research, behavioral activity research and questionnaire interview research. In the physical space investigation stage, the physical environment and structure of the community, including spatial layout, facility status and environmental quality, are investigated in detail through field investigation and map labeling, so as to establish the base map of the physical space and provide basic data for subsequent analysis. In the stage of behavioral activity investigation, the type, frequency and pattern of residents' activities in public space are recorded and analyzed by using techniques such as on-site counting method and tracking and labeling method, so as to understand the rhythm of residents' daily life and characteristics of space use. In the questionnaire interview and investigation stage, through personal interview and questionnaire survey, residents' perception, use and satisfaction with public space are deeply understood, and residents' opinions and feedback on space layout, facilities and environmental quality are collected. The comprehensive application of these three stages can comprehensively cover all aspects of community public space, and provide detailed data support and decision-making basis for community renewal and optimization.

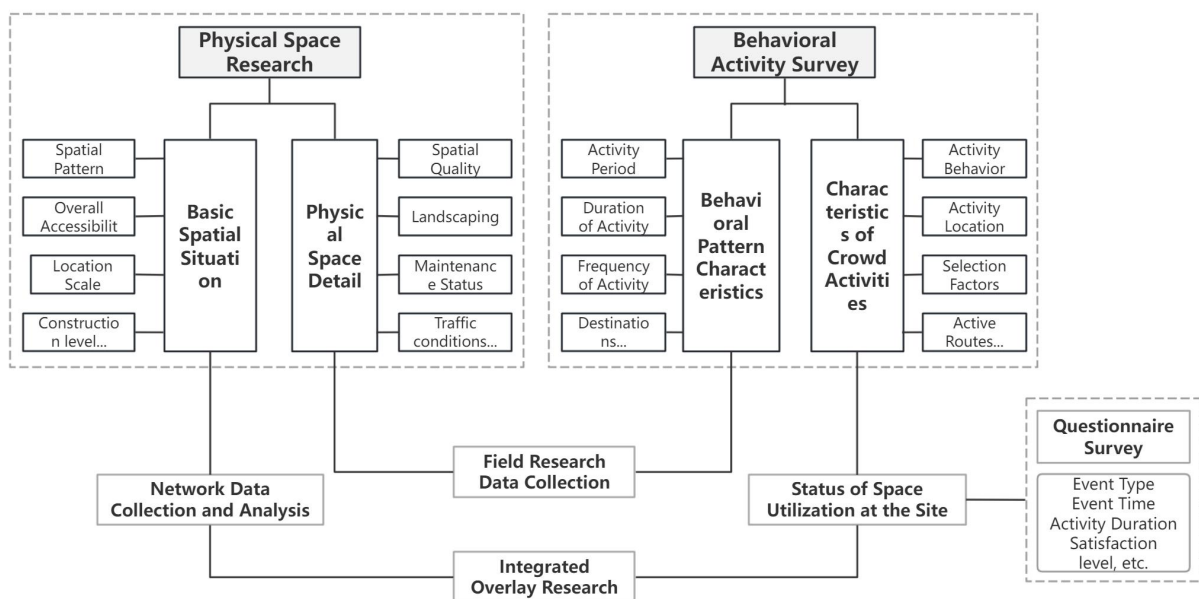


Figure 4- 2 Research Technology Pathway Framework

(Source: author's drawing)

### 4.3 Research on the Basic Situation of Community Public Space

#### 4.3.1 Overall Status of the Base

On the overall level of the city, Guangzhou Shigang Community is located in Nanshi Street, Haizhu District, Guangzhou City, Guangdong Province, which belongs to the typical old residential living area in Haizhu Old Town. The transportation condition of Shigang community is relatively convenient, there are many bus lines nearby such as Chungbian Street, Nanshe Street, Shigang Road, Shixi, etc., and you can transfer to 964 Road, 530 Road, 469 Road, 761 Road and many other bus lines, which cover all directions of downtown, and Shixi subway station, which is convenient for residents to reach the city center and other important areas quickly.



Figure 4- 3 Location Analysis Map of Shigang Community

(Source: author's drawing)

There are abundant urban resources related to living services around the community, and there are several residential communities around the community, such as Shigang Street, Fenggang Road, Xinzhu Street and other related residential communities, with a relatively dense residential population. There is Shixi business Circle near the community, including many supermarkets, shopping centers and restaurants, such as China Resources Vanguard, Wanda Cinema, etc., to meet the daily shopping and entertainment needs of residents; At the

level of public facilities, there are a number of parks and green Spaces in and around the community, such as Shigang Community Square. The urban green space along the river in the southern part of the community will be renovated and remodeled soon, providing residents with a good place for leisure walking. At the level of service resources, there are medical education and cultural facilities such as Shigang Community health service Station, kindergarten, primary and middle school, and South Stone Street cultural activity Center around the community. As a whole, although the community is facing the problem of aging, from the perspective of urban life, the community can form a more convenient life circle of different levels with the help of the surrounding urban resources.

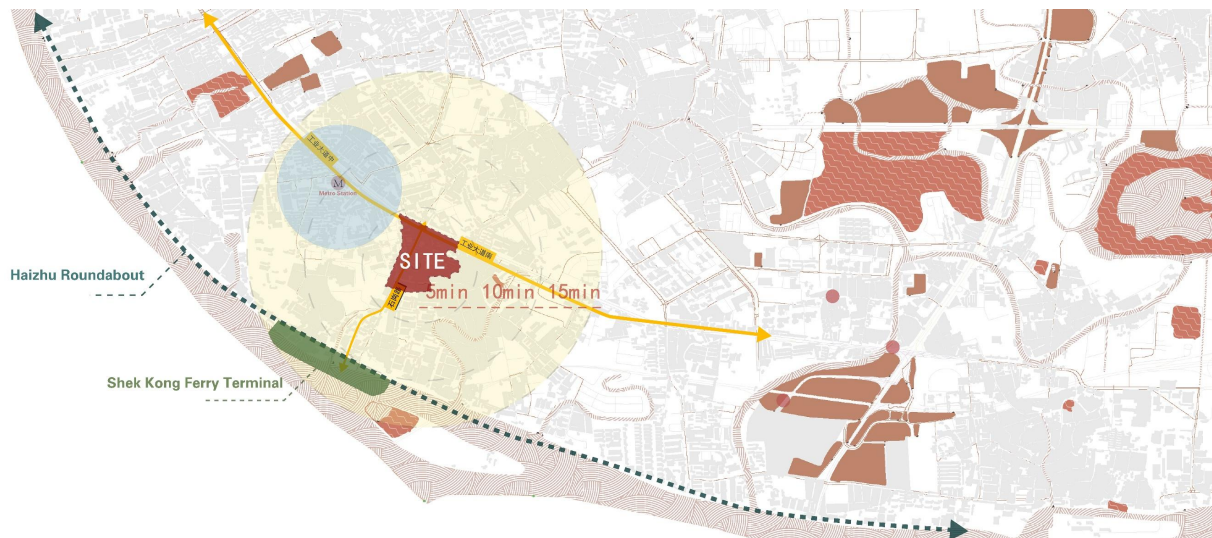


Figure 4- 4 Location Analysis Map of Shigang Community

(Source: author's drawing)

#### 4.3.2 Physical Space Research

From the perspective of overall material space, Shigang community and its surrounding space environment reflect the spatial characteristics of typical old communities, showing complex architectural texture, compact architectural layout, broken spatial form, and chaotic movement lines.



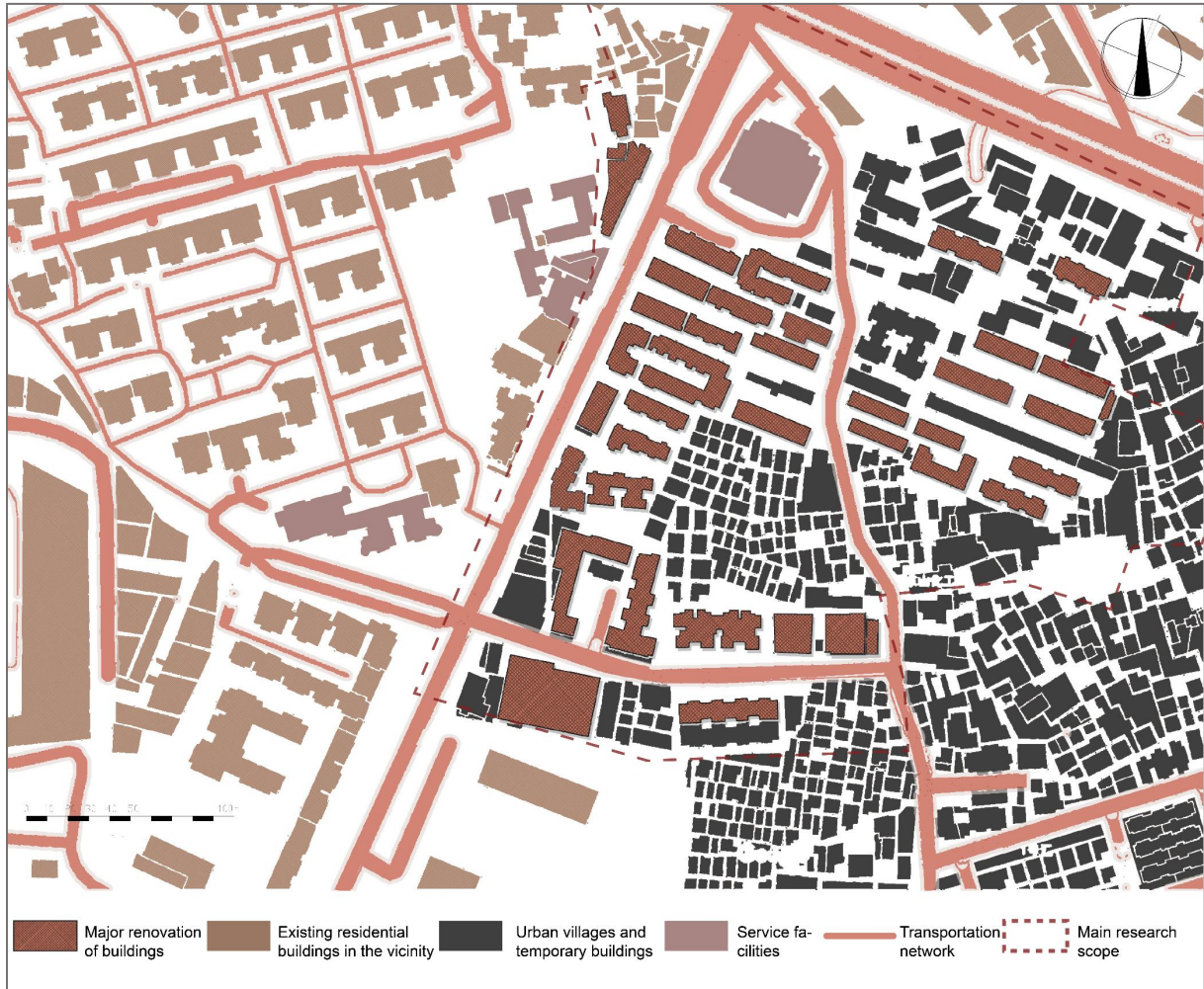


Figure 4- 5 Community Material Space Base Map

(Source: author's drawing)

In terms of traffic layout, the community is adjacent to the middle and south sections of Industrial Avenue, an urban arterial road. The community is spread out on both sides of Shigang Road, an urban branch road that extends from it. The road is two-way, two-lane, equipped with non-motorized lanes and pedestrian roads. However, the overall pavement is aging and damaged seriously, and there is a lack of barrier-free facilities. Due to the problems of early construction, there is a large height difference on the edge of the pedestrian road, resulting in the road width cannot be fully utilized, which has a certain impact on the travel efficiency and comfort of the elderly in the community. The walking width on the west side of the road is narrow, some sections are 1-2 meters, and there are height differences and road truncation, which continue to improve.

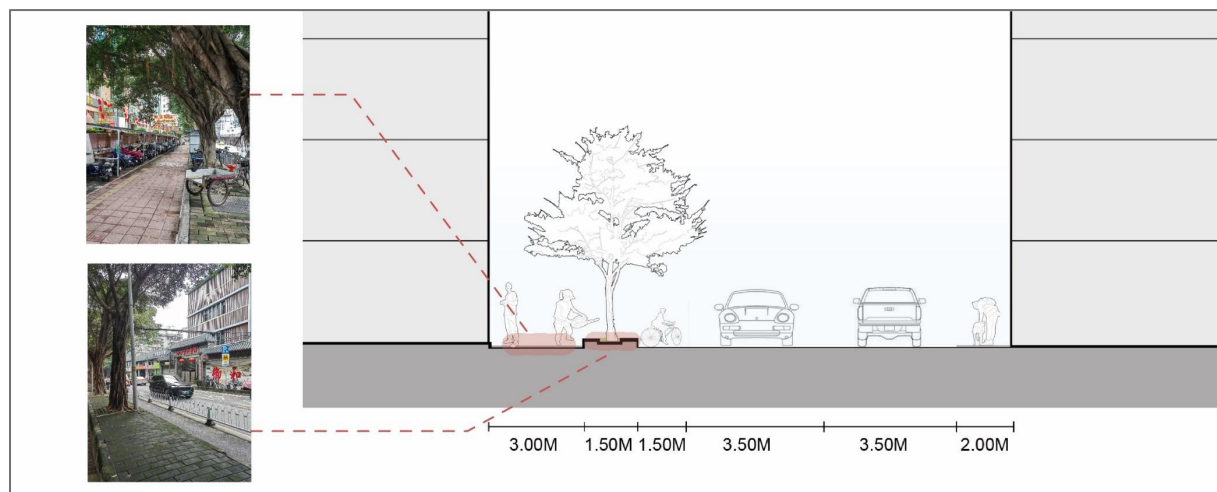


Figure 4- 6 Schematic Diagram of Shigang Road Section

(Source: author's drawing)

The overall appearance of the interior of the community is aging, the space is messy, the space shows obvious signs of old and use, and the internal public space is missing and the quality is difficult to be guaranteed. At the spatial layout level, due to the situation of walls, space occupation, etc., some space in the community has a certain degree of obstruction in accessibility, and some traffic space has a situation of "broken road". The space form of the community is mainly surrounded by buildings, walls, landscape greening and architectural pieces. Due to the ancient design and the lack of excessive consideration of the overall form of public space in the design level, the space form inside the community is relatively fragmented, and the edge boundary between various Spaces is fuzzy, lacking a clear and soft transition space. There is a certain degree of impact on the user's identification and activities.

At the level of space facilities, the public space in the community generally lacks relevant service facilities required by modern urban life, such as leisure facilities and sports facilities, etc. The supporting facilities in the space mainly include stone seats for temporary rest and temporary sports facilities for light activities. At the level of environmental quality and landscape style, the environmental style of the community has strong regional characteristics of Guangdong. Although the material space of the community is old, the landscape environment of the space has also been designed and maintained to a certain extent. There are flower ponds around the public space, and combined with the spontaneous landscape arrangement of residents, a greening system of relatively rich levels has been



formed. In addition, there are many older trees around and inside the community, which are used as landscape highlights to walk in various public Spaces. The utilization of these existing landscapes should also be one of the key points that should be considered in the landscape design of this scheme.



Figure 4- 7 Schematic Diagram of the Current Situation of Material Space

(Source: author's drawing)

Most of the residents in the community are middle-aged and elderly, so the aging content in the space should also be the focus of attention in the field of physical space research. According to the results of the field investigation and the photos of the status quo in the figure below, it can be seen that at present, the transformation of the community's space suitable for aging has not been promoted with relevant results: On the one hand, the design of community space may not give much consideration to the living needs of residents as they grow older. For example, some public Spaces are blocked due to design reasons such as terrain or the block of residential walls, which is not conducive to the activities of elderly people with

mobility difficulties. On the other hand, the aging of the community itself also causes different degrees of damage and disability of space and facilities, such as the depression of the road surface is easy to cause water in rainy days, the lack of maintenance in the dark produces moss, and the lack of anti-slip treatment of ramps is easy to cause safety accidents. At present, the age-appropriate transformation of public space is mainly reflected in the preliminary maintenance of some infrastructure, such as the repair of some road surfaces and the security reinforcement of community power facilities. The lack of space suitable for aging forms the spatial resistance of community public space, which makes the originally lacking public space unable to maximize its use value, and also affects the activity willingness of the elderly residents in the community to a certain extent.

On the whole, due to the social background of the community construction period, the design of the public space of Shigang community emphasizes practicality rather than aesthetics and interaction. The overall scale is small, the layout is compact, the overall planning is relatively old, and the overall planning lacks systematic and functional zoning. At the same time, the infrastructure is aging and inefficient, which is difficult to meet the diversified needs of modern residents. The space form is relatively simple, and the public activity places are limited, often dominated by simple squares, open Spaces or green dots. In addition, the public space of the old community often bears the important function of neighborhood socializing, but it also faces the problems of aging users and insufficient space management, which provide challenges and opportunities for renewal and transformation.

In the investigation stage of physical space details, research and summary of key spatial details of the community are carried out according to relevant research and design cases, such as public space nodes, portal nodes, gray Spaces, main streets and building interfaces, centralized square Spaces, sports and health Spaces, linear landscape Spaces, etc. The research results are integrated into three parts: point space, line space and area space.

#### (1) Point Space

Point space is a small point-like element in the public space of the old community, which is mainly a specific node with specific functions, including scattered nodes, portal nodes and

small activity nodes, such as units and the entry of shops along the street, independently placed tables and chairs and other facilities, temporary space devices, and retained trees in the space. Point space is relatively independent in space and small in scale, but it is an important node of community public activities, often becoming a place for community residents to temporarily stay, rest or simple social interaction. Although its space is small, its functions are concentrated, and it is the source of community vitality, carrying rich community life and cultural characteristics.



(a) Portal Node



(b) Facility Node



(c) Temporary construction Node

Figure 4- 8 Schematic Diagram of Community Point Space

(Source: Photo by the author)

The point space in Shigang community is relatively rich and complex, accompanied by a large number of residents in different ways of spontaneous transformation and utilization of behavior, but at the same time there are problems of space encroachment and Environmental Quality to be upgraded.

## (2) Linear Space

Linear space in the old community is mainly expressed as a linear channel or connecting element, represented by community streets and linear landscape, which is an important channel and link for residents' daily life, including roads, walkways, space corridors and other linear elements, connecting various points of space in the community, and is the path for residents' daily travel, which carries the transportation function and at the same time, provides residents with the opportunity of interaction and communication.



(a) Shigang Road Interface







Figure 4- 9 Schematic Diagram of Community Linear Space

(Source: Photo by the author)

At the same time, the line space of the community also contains the corresponding architectural interface, such as the street interface and landscape interface of the most important Shigang Road and Houhuangmiao Street, etc. The three-line transformation of the line space is also one of the main transformation needs of the neighborhood committee in the realistic level.

### (3) Surface Space

Surface space is a relatively large, centralized area with a certain area in the public space of the community, which has a more open view and a larger capacity to accommodate a larger number of people to carry out activities at the same time, such as centralized plazas, public open spaces, and so on. The face space in the community is relatively scarce, which is mainly reflected in the plaza at the entrance and the small plaza in front of the kindergarten, health station and other service facilities in the neighborhood.

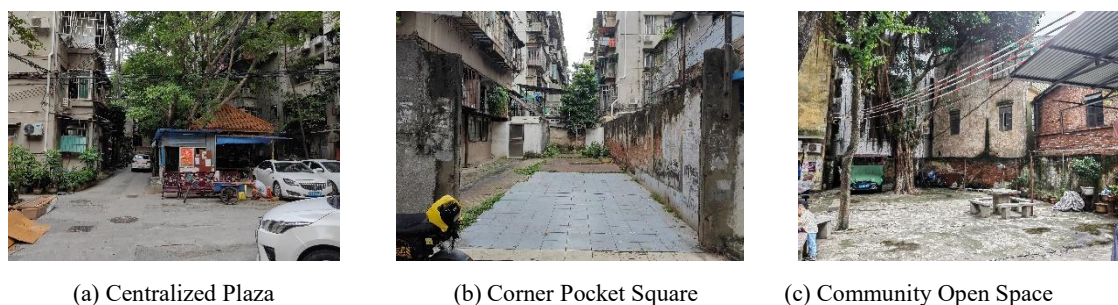


Figure 4- 10 Schematic Diagram of Community Domain Space

(Source: Photo by the author)

In general, in the community public space, the three dimensions of point, line and surface not only reflect the diversity of space types, but also reflect the complexity of its function and use mode, which together constitute the basic framework of its public space and the community public space network, but their respective problems and limitations also highlight the necessity of transformation and

renewal. As far as the current situation is concerned, the daily activities of the residents in the community are mainly concentrated in the area and line space, while the complex and broken point space in the community is largely not fully utilized, which will also be one of the key factors to be considered in the following design.

Table 4- 2 Classification and Summary of Community Public Spaces

Category	Main Content	Construction Level	Usage Frequency
<b>Point Space</b>	Specific functional nodes with certain functions, including scattered nodes, entrance nodes, and small activity nodes, such as units and shops along the street, independently placed chairs and other facilities, temporary space installations, reserved trees inside the space, etc.	Lower	Lower
<b>Linear Space</b>	Roads, sidewalks, space corridors, and corresponding architectural interfaces	Average	Relatively High
<b>Area Space</b>	Certain area concentrated areas with a certain size, such as central squares, public open spaces, etc.	Relatively High	Relatively High

(Source: drawn by author)

#### 4.3.3 Behavioral Activity Survey

The above analysis of the overall situation of the material space summarized the basic situation of the community public space and provided a general direction for the investigation.

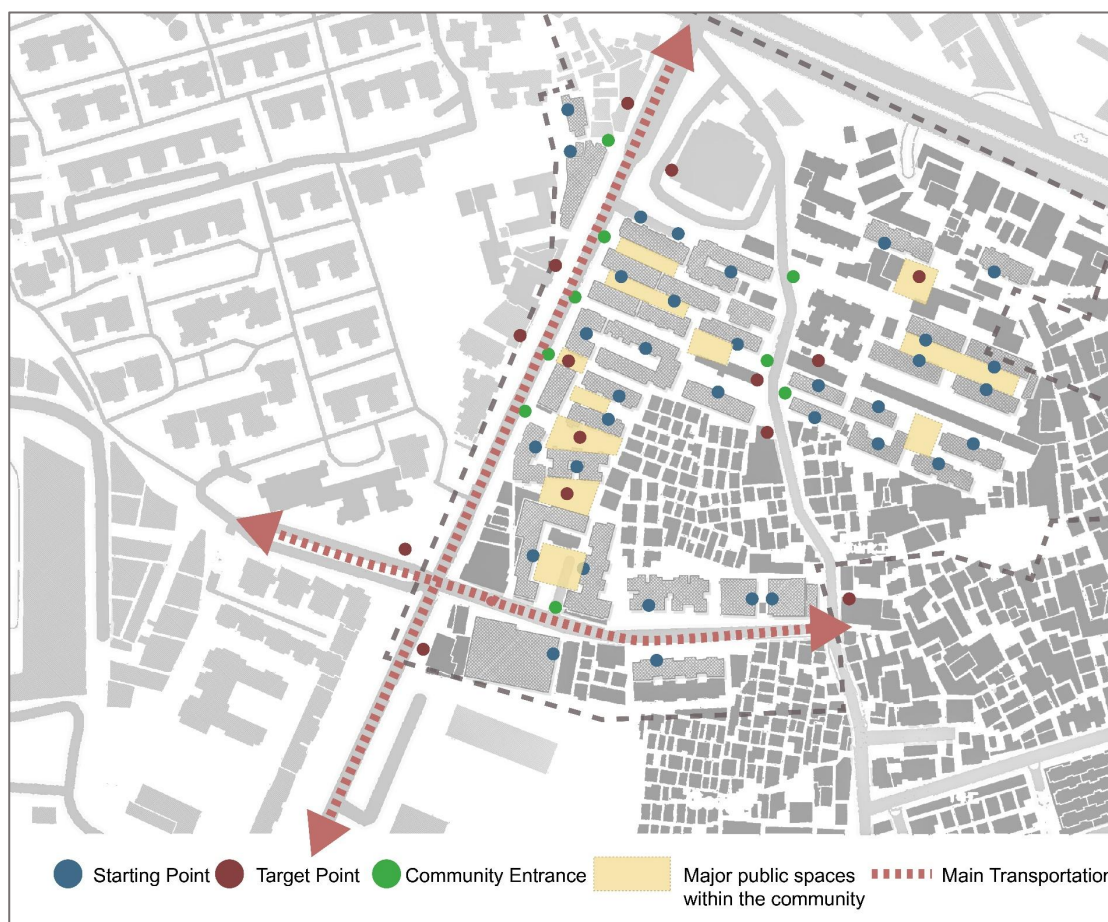


Figure 4- 11 Community Transportation Network and Activity Node Distribution Map  
(Source: drawn by the author based on the survey results)

The research content of this section is mainly aimed at observing and recording the behaviors and activities of the community residents in the public space. Through the on-site investigation of the site, the investigation part of the material space was supplemented and amended. Summarize the daily living habits and space usage of community residents.

In combination with observation methods such as on-site survey method and tracking record method, the entrances and exits, activity starting points and target points in the site are firstly surveyed and marked. In combination with the distribution of the main transportation network and public space of the community, it can be found that the main activity destinations of the community residents are roughly consistent with the public space of the community, that is, the main activities of the residents are concentrated in the internal public space.

Due to the particularity of the community and its residents, the place and time of



activities are relatively concentrated, and the most important nodes are several public space nodes close to the community center and adjacent to the entrance. The first reason is that the centralized space inside the community is relatively lacking, while the large space can better satisfy the residents' needs for leisure and social interaction. In addition, the space quality of this type is higher than others, and it is equipped with corresponding simple leisure facilities; On the other hand, the node at the end of the community has a small number of participants due to the space barrier caused by the wall and other temporary facilities.

Select public Spaces at A, B and C inside the site, where A is a centralized public space at the main entrance of the community and equipped with simple activity facilities; Place B is A public space between residential buildings. Compared with place A, the area is slightly smaller and the facilities are less. C is the public space at the end of the community traffic, with a small area and weak accessibility. During the same hours when residents are more active (4:30 p.m. to 5 p.m. : The number of participants was measured and compared. According to the observation records, the total number of participants in place A was 41, the number of participants in place B was 11, and the number of participants in place C was 6. It can be seen from the results that residents prefer the space with strong spatial accessibility, large area and perfect facilities to choose the activity location. In contrast, the insufficient space utilization rate in this aspect is very low, and the overall space utilization situation is uneven.



Figure 4- 12 Comparison of Community Public Space Activities at the Same Time

(Source: drawn by the author based on the survey results)

In addition, through on-site observation and part of interviews at this stage, the main population types in the community can be divided into three categories according to age and social status: The first category is the young elderly and the elderly aged between 60 and 69 years old; The second category is the elderly, that is, older people over 70 years old; The third group is middle-aged and young people, and this part of the population is mainly the children of the elderly in the community. The activity scope and use participation of different population types are also different. Through observation, it can be summarized that the relationship between space use degree, activity participation and age level of community public space shows an inverted "smile" curve, and the younger elderly group is the main user with the highest participation in public space activities. In addition, the activities of children in kindergartens near the community after school are mainly taken care of by the elderly in the community, so the two activities overlap in time and participation. Young and middle-aged people mainly bear the responsibility of caring for the elderly and may not live in the community, so the use of space is low; However, due to the limited energy or activities of the elderly, their participation in activities is also low. In the subsequent design, more consideration should be given to the travel problems of the

elderly, and functional space should be arranged according to the walking distance and leisure facilities should be set up to facilitate the travel of the elderly.

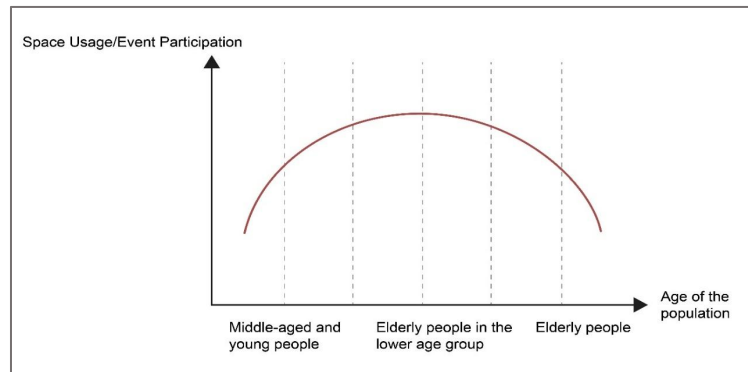


Figure 4- 13 Analysis of Space User Usage and Participation

(Source: drawn by the author based on the survey results)

At the level of activity time, through the observation of behavioral activities, it can be summarized that the elderly residents in the community are mainly concentrated in the morning from 9 to 11 o'clock and in the afternoon from 15 to 17 o'clock, among which the main activities in the morning are walking, exercising, listening to news, etc., while the social activities such as chatting and leisure, chess and card entertainment are mainly concentrated in the afternoon.

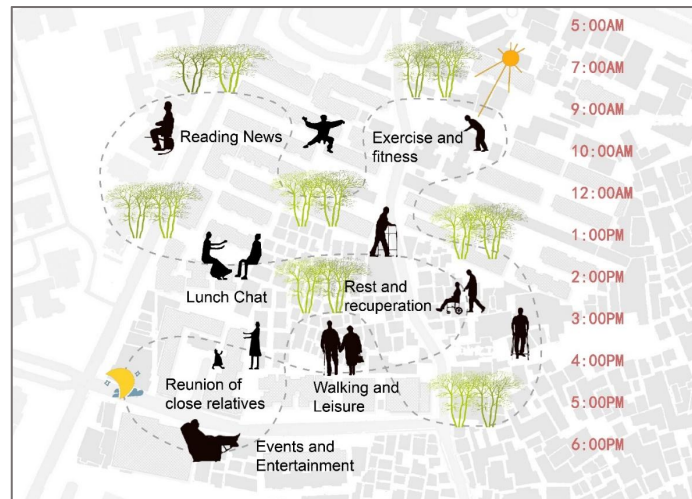


Figure 4- 14 Schematic Diagram of Residents' Time-Series Activities

(Source: drawn by the author based on the survey results)

#### 4.3.4 Space Use Preference and Satisfaction Survey

The research on space use preference and satisfaction is mainly carried out in the

form of questionnaires and interviews with community residents, as the basis for in-depth understanding of residents' use habits, preferences and satisfaction level of existing public space. The survey mainly selects representative middle-aged and elderly residents in the community as the survey objects, involving the layout of public space, facility condition, environmental quality, safety, barrier-free facilities, frequency and preference of space use, etc., and collects residents' specific suggestions and expectations for the improvement of public space, aiming to accurately grasp the actual needs and expectations of residents.

The subjects of this survey were mainly residents of Dual-aged Community in Guangzhou. A total of 78 valid questionnaires were collected, including 51 males and 27 females. The gender composition ratio of the population was similar to the previous observation. The survey results show that most residents have lived in the community for a long time, mainly 20-40 years, accounting for about 70.5%, which also means that residents have a deeper understanding and emotional attachment to the community environment, and their feedback has a high reference value.

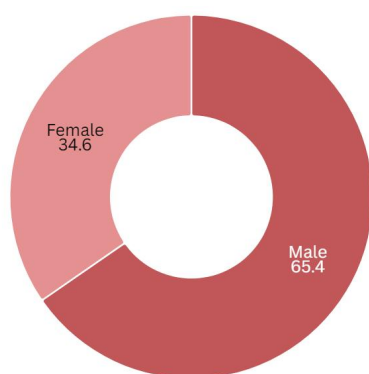


Figure 4- 15 Gender Ratio of Participants  
(Source: drawn by the author based on the survey results)

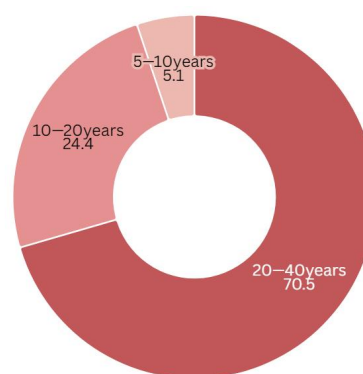


Figure 4- 16 Statistics on length of residence  
(Source: drawn by the author based on the survey results)

At the level of specific activity places, the most commonly used public space for residents is the entrance square. As the "front" of the community, the entrance square has good accessibility and convenience, and is the only place for residents to enter and exit the community. The second is the empty square inside the community, whose spacious space provides residents with rich activity choices; The public open space

between residential buildings also has a high frequency of use, which is closely related to the convenience of residents' daily life, and reflects the importance of the daily characteristics of public space. On the whole, residents mainly tend to the space with strong accessibility and publicity for activity places.

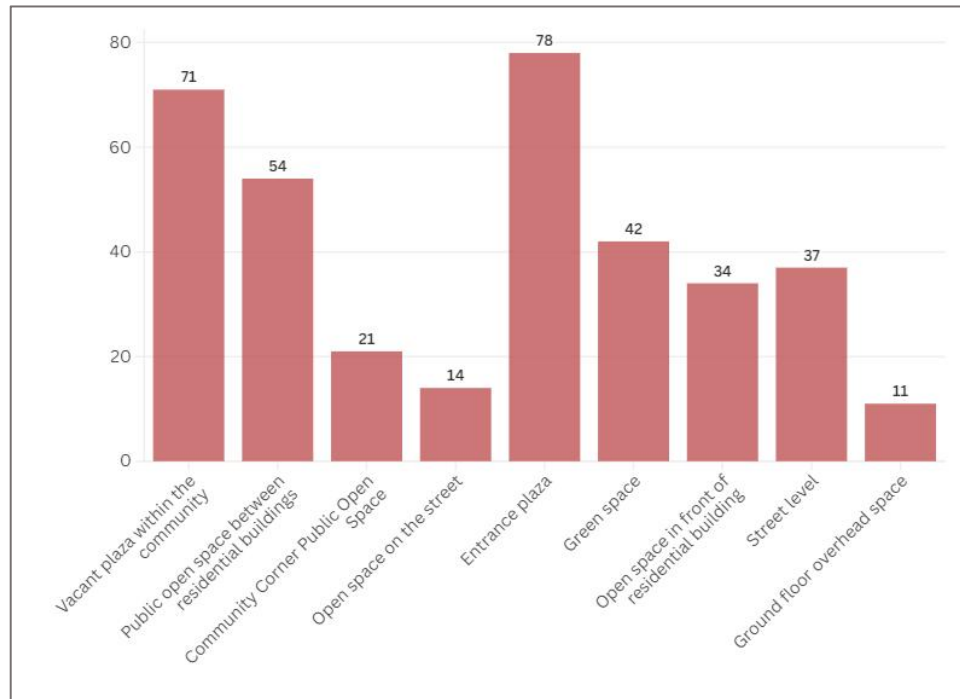


Figure 4- 17 Statistics of Public Space Activity Venues

(Source: drawn by the author based on the survey results)

In the choice of activity types, the activity types of the elderly are more diverse and rich, reflecting the diversified needs of residents for life. Among them, social activities are one of the main choices of residents in public space, which also reflects that community public space plays an important role in promoting neighborhood communication and enhancing community cohesion. Recreational activities (such as chess and cards, etc.) also have a high participation, showing that residents have a strong demand for leisure and entertainment; In addition, walking/jogging, fitness exercises, reading/sitting are also common types of activities for residents, reflecting residents' pursuit of a healthy lifestyle and their needs for spiritual and cultural life.

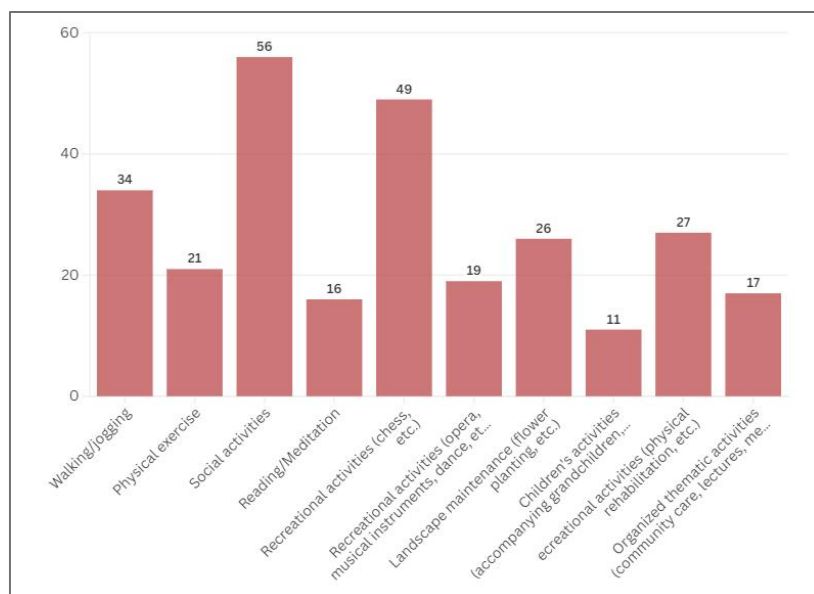


Figure 4- 18 Statistics of Public Space Activity Types

(Source: drawn by the author based on the survey results)

As for the reasons for the choice of activity places, the main factors for residents to choose public space are generally spatial quality, environmental quality, and the degree of facilities improvement, followed by large space and convenient access, indicating that spacious space and convenient transportation are important factors to attract residents to use public space. In addition, the rich and lively activities are also the reasons for some residents to choose, which echoes the high participation in social activities, reflecting the residents' hope that the public space can provide a variety of activity choices and create a lively atmosphere.

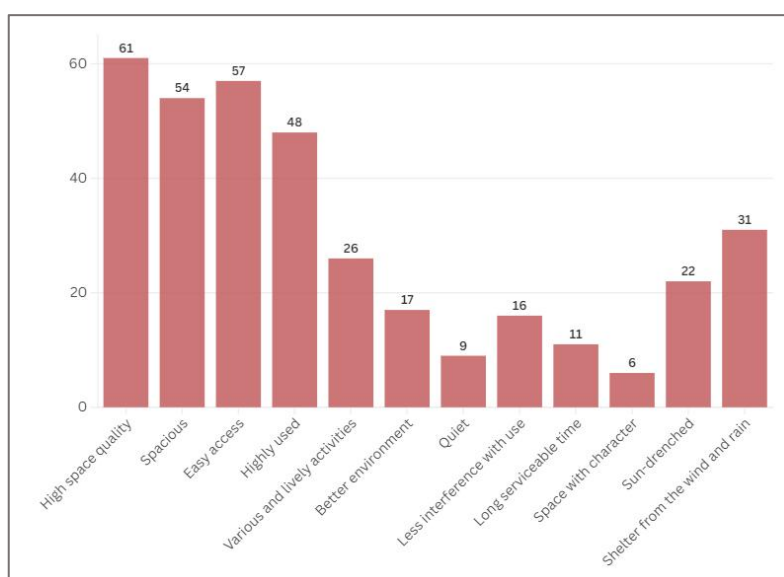


Figure 4- 19 Statistics on Reasons for Selecting Activity Space

(Source: drawn by the author based on the survey results)

Residents have a high frequency of activities in public space, with 37 people coming more than twice a day, accounting for about 47.4%, and 22 people coming almost every day, accounting for about 28.2%. This indicates that community public space has become an indispensable part of residents' daily life, providing residents with rich activity choices and communication platforms. At the same time, residents are more inclined to carry out activities in the community because of their emotional support and living habits of the community for many years. From the perspective of activity duration, the daily activity duration of most users is about two hours, which is enough to show the importance of public space as a carrier of life scenes for the daily sexual life of elderly residents in the community.

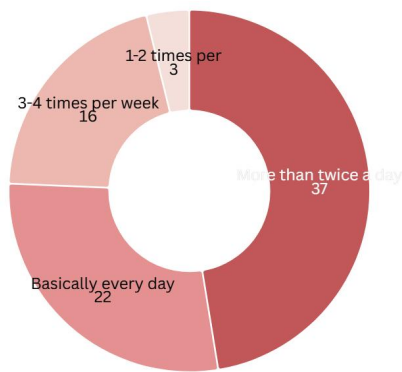


Figure 4- 20 Activity Frequency Statistics  
(Source: drawn by the author based on the survey results)



Figure 4- 21 Activity Duration Statistics  
(Source: drawn by the author based on the survey results)

The survey results show that the overall satisfaction of residents on community public space is low, and the proportion of residents who are very dissatisfied and not very satisfied is as high as 63%, that is, the community public space currently has a large shortage in many aspects, unable to meet the expectations and needs of residents; In the direction of future improvement, the material space has won the most recognition, including the improvement of infrastructure and the optimization of spatial layout. For example, some residents think that the seats and sports facilities in public space are not perfect or the distribution is unreasonable, which affects their use experience. In addition, there is an urgent need for transformation to adapt to aging. Such as the lack of barrier-free access, suitable facilities for the elderly.



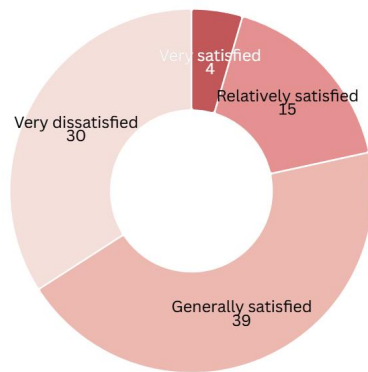


Figure 4- 22 Statistics on overall satisfaction with public spaces

(Source: drawn by the author based on the survey results)

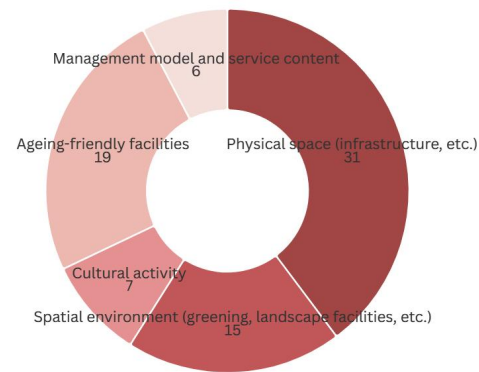


Figure 4- 23 Statistics on public space improvement directions

(Source: drawn by the author based on the survey results)

In addition to the questionnaire survey, the author also sought relevant interviews with elderly people who were more willing to cooperate. During the interview, some residents of the community expressed a strong desire to transform the current living environment. Due to the existence of newly built communities around them, the old community inevitably became the object of comparison, and residents were more longing for the life vision of modern public space. On the whole, this survey conducted an in-depth analysis of the residents' use, satisfaction and improvement needs of public space in Dual-aged community of Guangzhou, providing valuable data support and reference for the optimization of community public space. Community public space plays an important role in promoting residents' social interaction and meeting their needs for leisure and entertainment, but at the same time, there are also some problems that need to be improved, such as the quality of space to be improved, insufficient aging facilities, and insufficient cultural activities. The existence of these problems not only affects the residents' use experience and quality of life, but also restricts the full play of the community public space function.

#### 4.4 Sorting Out the Existing Problems of Public Space in Shigang Community

Through the detailed investigation and analysis of the public space of Shigang



community, it can be found that there are many problems in material space, environmental quality, functional configuration, cultural connotation, management services and other aspects, which not only affect the daily life of residents and the overall image of the community, but also restrict the sustainable development of the community.

#### 4.4.1 Problems at the Material Space Level

(1) Unreasonable spatial layout: the public space layout of Shigang community is scattered and lacks systematic planning and integration. Part of the space is blocked by buildings, walls, etc., resulting in poor connectivity and accessibility of the space, and residents need to detour a longer distance in the process of use, which brings inconvenience to the elderly and residents with limited mobility. For example, the green space and square inside the community are divided into several small pieces, unable to form a continuous activity space, affecting the residents' leisure and entertainment activities.

(2) Aging and damage of facilities: Due to the early construction age of the community, the facilities in the public space are generally aging seriously, and some facilities can not be used normally. Such as corroded equipment, damaged seats, dim street lights, etc., not only affect the use experience of residents, but also have certain security risks. For example, some facilities such as outdoor tables and chairs in the community cannot be moved and there are security risks, and residents need to be extra careful when using them to avoid accidents.

(3) Lack of barrier-free facilities: the construction of barrier-free facilities in the community is seriously insufficient, and many public Spaces are not equipped with barrier-free access, handrails, low facilities, etc., which brings great difficulties to the travel and activities of special groups such as the elderly and the disabled. For example, there are some height differences in the community, and the long-distance ramps connecting the public space are not installed with barrierless and anti-slip facilities, which may have safety problems. The stairs in the community are also not equipped with handrails, and the elderly are easy to lose their balance when going up

and down the stairs, and there is a risk of falling.



(a) Unreasonable Spatial Layout

(b) Aging and Damaged Facilities

(c) Lack of Barrier-free Facilities

Figure 4- 24 Corresponding Diagram of Existing Problems in Material Space

(Source: Photo by the author)

#### 4.4.2 Problems at the Functional Configuration Level

(1) The function is relatively single: the public space in the community is relatively single-functioned, mainly focusing on simple recreation and activities, and lacks diversified functional configurations. For example, the squares within the community are mainly used for residents' walks and leisure, and there are no special sports facilities, senior activity centers, cultural activities and other functional areas, which can't meet the diversified needs of the elderly and residents of different ages.

(2) Inadequate facilities: Although some public spaces have certain functions, they are not well-equipped with facilities and cannot provide residents with a good experience of using them. For example, although centralized recreational facilities are set up in the core spatial nodes, they are unable to satisfy the demand for activities in multiple contexts due to imperfect configurations and other problems.

(3) Low space utilization rate: Due to irrational functional configuration and imperfect facilities, the utilization rate of public space in the community is low, and some of the space has been idle or occupied for a long time. Some open spaces within the community are used by residents for piling up sundries or potting green plants, which cannot fulfill their proper public space functions; some public facilities cannot be used normally due to a lack of maintenance and management, resulting in a waste of space resources.



(a) Relatively Single Function



(b) Inadequate Facilities



(c) Low Spatial Utilization

Figure 4- 25 Function Configuration Existing Problems Corresponding Diagram

(Source: Photo by the author)

#### 4.4.3 Problems at the Culture-building Dimension Level

(1) Lack of cultural atmosphere: The public space of the community lacks a strong cultural atmosphere, the integration of cultural elements is insufficient, and there is a lack of facilities for cultural display and publicity, such as cultural corridors, cultural walls, etc., which fails to provide residents with a rich cultural experience and spiritual enjoyment. For example, there are no facilities in the public space of the community to display the history and cultural characteristics of the community, resulting in the surrounding residents knowing less about the culture of the community and not being able to feel the cultural charm of the community.

(2) Lack of cultural activities: There is a lack of cultural activities in the community, and there is a lack of diversified cultural activities organized and carried out. The cultural life of community residents is relatively monotonous, unable to meet the spiritual and cultural needs of residents. The community is less likely to organize cultural performances, art exhibitions, cultural lectures and other activities, and the cultural life of elderly residents is mainly dominated by chess and cards, chatting, etc., lacking rich cultural experiences and communication opportunities.

(3) Insufficient cultural identity: Due to the lack of cultural connotations, community residents have insufficient cultural identity of the community, community cohesion and centripetal force are relatively weak, residents' sense of belonging and pride in the community is not strong, and the cultural cohesion and attractiveness of the community needs to be improved. Residents lack understanding and recognition of the community's cultural characteristics and direction of development, and

participation in the community's cultural activities is low, with fewer cultural exchanges and interactions between residents.

#### 4.4.4 Problems at the Service and Management Level

(1) Inadequate management mechanism: The public space management mechanism in the community is not sound enough, lacking effective management organizations and management measures. The management of public space within the community is relatively loose, and there are management blind zones in some areas, resulting in the maintenance and management of public space not being in place. For example, there is no special public space management organization in the community, and the maintenance and management of public space mainly relies on community committees and residents' self-initiated organizations, which is a weak management force and unable to solve the problems existing in public space in a timely manner.

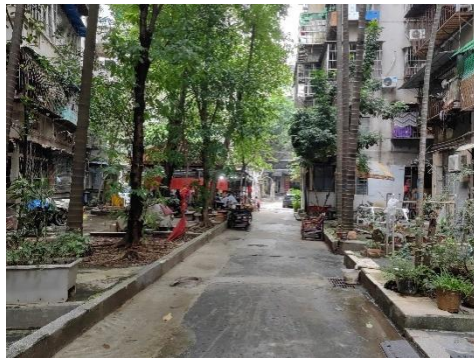
(2) Inadequate public services: Due to the lack of property service providers in the community, the level of public services is low, and it is unable to provide residents with timely and effective services. For example, environmental cleaning services in public areas are not in place, cleaning of public spaces is not timely, and garbage cleaning is not thorough; maintenance services in the community are not timely, and public facilities cannot be repaired in time when they are damaged, which affects the normal use of residents.

(3) Low participation of residents: residents' participation in community public space is low, and they lack the awareness and enthusiasm to participate in the management and maintenance of community public space. Residents lack a sense of responsibility for the use and maintenance of public space, and some residents have behaviors of occupying and destroying public space at will. For example, some residents are indifferent to the maintenance and management of public space and seldom take the initiative to participate in the cleaning and maintenance of public space; some residents park their cars and pile up sundries in public space at will, affecting the normal use and aesthetics of public space.

#### 4.4.5 Problems at the Environmental Quality Level

(1) Single landscape and greening: The greening landscape of the space is characterized by a relatively single type of plant, irrational configuration, lack of characteristic landscape and insufficient sustainability, etc. Although it has undergone a number of spontaneous renewals by the residents, the overall view of the community landscape lacks a unified design and guidance.

(2) Low landscape coverage: The green coverage of the community is relatively low, and some public spaces lack green vegetation, resulting in a monotonous and boring environment. Although there are some trees and green spaces around the community, there are fewer green spaces inside, which cannot provide residents with sufficient places for leisure and activities. For example, most of the squares and open spaces in the community are simply hardened and lack the embellishment of greenery, making the space look even more empty and uninteresting.



(a) Single Landscape Greening



(b) Low Landscape Coverage

Figure 4- 26 Correspondence Diagram of Existing Environmental Quality Problems

(Source: Photo by the author)

### 4.5 Application of Comprehensive Evaluation System

#### 4.5.1 Evaluation Procedure

Based on the investigation and integration of Shigang community in this chapter and the comprehensive evaluation system established in Chapter 4 above, scores are scored for each index level of the community. At the same time, combined with the relevant case analysis above, corresponding cases are selected for the index dimension

of each criterion layer to evaluate the scores of similar processes. Among them, the corresponding indicators of hardware dimension are: That is, the part of spatial layout, environmental quality and space suitability for aging is selected for corresponding evaluation in Guangzhou Sanyanjing Community; the index of software dimension is the intelligent service corresponding to the renovation project of Beijing Jinsong North Community; the index of spiritual dimension is the humanistic spirit corresponding to the renewal of Japan Hanahata Community. The index scores corresponding to Shigang community and selected cases are compared to determine the specific objective situation corresponding to each index, and the results are supplemented by the analytic hierarchy process results corresponding to each index, so as to obtain the corresponding comprehensive evaluation scores of each index.

The results are compared and analyzed to determine the total score of Shigang community comprehensive evaluation, and compare the scores of each index, so as to further analyze the results.

## 4.5.2 Comprehensive Evaluation Score

### 4.5.2.1 Spatial Layout Score

#### (1) Spatial Accessibility:65 points

From the overall situation of the community survey, the accessibility of the main public space in Shigang community should be relatively complete. The internal walking distance of the main activity space such as the small square and green space in the community is about 3-10 minutes. The walking space on both sides of the main road Shigang Road is basically consistent, and the width of the sidewalk on the west side is only 1-2 meters, which is insufficient. But the walking experience is poor. Due to the differences in construction and management, there are many spatial obstacles in the community, resulting in some roads becoming a certain extent of the road. For example, in part of the space, the wall obstructs the user's movement route, or in part, the access gate set for management considerations also forms a similar space barrier.





Figure 4- 27 Spatial Accessibility Analysis Diagram

(Source: author's drawing)

As a control case, after several rounds of community renewal activities, Guangzhou Sanyanjing Community has been relatively complete in spatial layout and accessibility, so the score is 85 points.

#### (2) Spatial Functional Completeness and Recognizability:55 points

On the whole, the public space of Shigang community lacks functional guidance. Most of the Spaces are only simple material entities, but lack consideration and design at the level of functional implantation. Only a few core areas are designed as simple rest Spaces through the arrangement of facilities, and their functions are relatively simple. From the perspective of facilities, the types of facilities in public space are less diverse, mainly simple leisure facilities, lack diverse configuration, and the number is relatively insufficient to meet the daily use needs of a large number of community residents. The space inside the community currently lacks a signage system to provide clear guidance on how to use it.

Table 4- 3 Statistics on the Functions and Facilities of Public Spaces in Shigang Community

Types of public space facilities				
Large and Medium Leisure Facilities	Large and Medium Leisure Facilities	Large and Medium Leisure Facilities	Large and Medium Leisure Facilities	Large and Medium Leisure Facilities

**Types of public space facilities**



(Source: compiled by the author based on survey results)

In contrast, the spatial renewal of Sanjing community creates functional partitions of community space through the placement of various types of sports facilities and entertainment facilities, so the score is 80 points.

### (3) Spatial Form:45 points

According to the field research results in this chapter and the illustrations, it can be seen that the community public space is scattered, divided into fragmented plots by buildings and walls, and part of the space is occupied by temporary buildings or debris (such as the activity square occupied by electric vehicles and motor vehicles parked at will). At the same time, due to the lack of overall planning, the utilization rate of public space is low, and some Spaces are also abandoned corners due to lack of maintenance. In contrast, although Sanyanjing community has been updated for many times, part of its space is also subject to the high-density old community planning, and its form is broken to a certain extent, so the overall score is 75.



Figure 4- 28 Spatial Functional Integrity and Recognizability Analysis Diagram



(Source: author's drawing)

#### 4.5.2.2 Environmental Quality Score






##### (1) Spatial Quality:50 points

According to the results of the residents' satisfaction survey, most of the community residents' attitudes towards the current space quality are "not satisfied" and "not very satisfied". From the current situation, the overall environmental quality of the community public space is also relatively rundown and needs to be renewed, and it is easy to further adversely affect the environment in special circumstances such as rainfall. Therefore, this score is 50 points after comprehensive consideration. The spatial environment quality of Sanjing community is relatively complete at present, with a score of 80.

##### (2) Landscape Aesthetics:65 points

According to the survey, the greening rate of Shigang community is relatively low, about 20%, due to the compact public space. Some landscape nodes (such as the flower pond at the entrance of the community) have a certain degree of design sense, but the overall lack of theme. Most landscape features are composed of residents planting potted plants spontaneously, but the plant configuration is single (mainly evergreen shrubs), and the seasonal changes are insufficient. The overall score is 65 points. The renewal of Guangzhou Sanyanjing community involves the construction of landscape and the emphasis on greening. For example, relying on the cultural gene of historical districts, the theme landscape nodes such as "school art gallery" and "Banyan Square" are built. The overall score is 80 points.

Table 4- 4 Statistics of Public Space Landscape in Shigang Community

Summary of Public Space Landscape Features				
Summary of Public Space Landscape Features	Summary of Public Space Landscape Features	Summary of Public Space Landscape Features	Summary of Public Space Landscape Features	Summary of Public Space Landscape Features
				

(Source: compiled by the author based on survey results)

(3) Usage and Maintenance:45 points

At present, the public landscape and facilities in Shigang community have a relatively high completeness rate, and most of the facilities show aging phenomenon, which usually does not affect the basic use. However, due to the lack of service providers, the frequency of facility maintenance is less, and the satisfaction of residents is also low, with a score of 45. The corresponding service mechanism has been established in the control case of Guangzhou Sanyanjing community, so the comprehensive score is 70 points.

4.5.2.3 Intelligence Service Score

(1) Service Quality:40 points

Due to the lack of property services in Shigang community, most of the daily affairs are handled by the neighborhood committee, and the corresponding speed and professionalism are lacking, with a score of 40 points. Comparison case Jinsong North community service quality residents satisfaction has been higher, the score is 75 points.

(2) Management Mechanism:50 points

At present, the community information management is still in the preliminary construction stage, and there are management mechanisms such as access control facilities and temporary duty places, with a comprehensive score of 50 points. The Jinsong North community renewal summary of the "Jinsong model" through the intelligent parking system, property repair App, residents' discussion platform to achieve market operation, has become the old community renewal management mechanism to build a benchmark case, the score of 85 points.



Figure 4- 29 Shigang Community Management Elements Combing

(Source: Photo by the author)

(3) Resident Participation:40 points

Low community participation and lack of transparent information distribution channels scored 40 points. Jinsong North community established the "Rainbow Bridge seven color volunteer service team", residents self-governance covers most of the public affairs, the score is 80 points.

4.5.2.4 Humanistic Spirit Score

(1) Demand Satisfaction:40 points

At present, there are few matched humanistic activities in Shigang community, and only the community neighborhood committee and street office provide care for the elderly residents from time to time at the level of medical care and old-age care, with a comprehensive score of 40 points. As a control case, Hanahata Community in Japan integrated scattered plots through "block renewal" to create a three-level spatial network of "life axis, urban axis and regional axis", and based on the spatial renewal to create the satisfaction of human activities, with a comprehensive score of 60.

(2) Living Scene:55 points

Since the main residents of the community are the elderly and have a lot of free time, the community space spontaneously produces corresponding life scene activities, mainly morning exercise, chess and card and other fixed modes, but the activity scene is single and lacks innovation, and the historical memory carrier such as the collective memory of residents cannot be integrated into the scene construction, and the comprehensive score is 55 points. Hanahata Community transformed the old factory into a community cultural center, and regularly held "memory workshops" to activate intergenerational interaction and other daily activities, with a comprehensive score of 80.

(3) Neighborhood Interaction:50 points

Most residents of the community have lived here for a long time and are relatively familiar with neighbors, so the interaction frequency is relatively high. However, the public space lacks guidance for communication behaviors, and the

integrity of this aspect is low, with a comprehensive score of 50. Its control case, Hanahata Community, is valued at 65 points.

#### 4.5.2.5 Spatial Aging Adaptability Score

##### (1) Safety:40 points

The internal space of the community lacks a safe community, there is no emergency calling equipment, some facilities have certain security risks due to aging, while the night lighting is insufficient, and the overall lack of consideration for aging safety, the overall score is 40 points. As a corresponding case, the building of Sanyanjing community in Guangzhou for aging is relatively complete, scoring 75 points.

##### (2) Comfort:65 points

Overall, the use of space inside the community is greatly affected by natural conditions such as weather and time period. There are more trees and plants in the space, and the shading effect is good. However, a large number of facilities lack user-friendly design, such as the hard material of seats, which is not conducive to the elderly to carry out activities, and the comprehensive score is 50 points. The renewal of Sanjing community fully considers the needs of the elderly group activities, and this score is 80 points.

##### (3) Accessibility:40 points

The construction of Shigang community lacks barrier-free access facilities, which has a great impact on the actions of the elderly and wheelchair users. At the same time, there are many space barriers in the community, which affect the activity routes of the elderly to a certain extent. The score of this is 40. Sanyanjing community has been renewed and designed to provide full coverage through all-age friendly parks and barrier-free ramps, becoming a typical case of an age-friendly community with a comprehensive score of 80.

### 4.5.3 Analysis of Evaluation Results

According to the obtained comprehensive evaluation score, combined with the

method determined above, the weight of each score is multiplied by percentage and calculated by comparison with the case to obtain the complete comprehensive evaluation result.

Table 4- 5 Statistics of Shigang Community Public Space Evaluation Results

Criteria Layer Indicator	Indicator Layer Indicator	Combined Weight (Wi)	Score of Shigang Community (2)	Optimal Value (3)	Ratio (4) = (2) ÷ (3) × 100	Comprehensive Score (5) = (4) × 100
Spatial Layout	Spatial Accessibility	0.0917	0.655	0.85	76.47	7.01
	Spatial Functional Completeness and Recognizability	0.0843	0.555	0.8	68.75	5.78
	Spatial Form	0.0678	0.45	0.75	60.00	4.07
Environmental Quality	Spatial Quality	0.0769	0.5	0.8	62.5	4.81
	Landscape Aesthetics	0.0731	0.65	0.8	81.25	5.94
	Usage and Maintenance	0.0684	0.45	0.7	64.29	4.40
Intelligent Services	Service Quality	0.0597	0.4	0.75	53.33	3.18
	Management Mechanism	0.0547	0.5	0.85	58.82	3.22
	Resident Participation	0.0489	0.4	0.8	50.00	2.45
Humanistic Spirit	Demand Satisfaction	0.0796	0.4	0.6	66.67	5.31
	Living Scene	0.0647	0.55	0.8	68.75	4.45
	Neighborhood Interaction	0.0539	0.5	0.65	76.92	4.15
Spatial Aging Adaptability	Safety	0.0539	0.4	0.75	53.33	2.87
	Comfort	0.0605	0.5	0.8	62.5	3.78
	Accessibility	0.0475	0.4	0.8	50.00	2.38
合计						63.78

(Source: compiled by the author based on survey results)

From the evaluation results, although the spatial layout has a certain degree of accessibility, due to historical legacy problems and insufficient management, the connectivity and integration of space is poor, at the same time, the functional configuration of community public space is relatively single, lacking in diversified functional implantation, and unable to meet the growing diversified needs of the residents; in terms of Environmental Quality, the public space of the community of Shigang as a whole presents an aging and dilapidated state, with low coverage rate of green, landscape style lacking unified design and cultural connotation, making it

difficult to meet the residents' needs for a comfortable and aesthetic environment. In terms of environmental quality, the public space of Shigang community is in an aged and dilapidated state, with a low coverage of greening and a lack of unified design and cultural connotation of landscape, which makes it difficult to meet the residents' needs for a comfortable and beautiful environment; the shortcomings of the Humanistic Spirit level are embodied in the lack of community cultural activities and the lack of cultural atmosphere, and the lack of a mechanism for guiding and facilitating the promotion of neighborly interactions, although there is a certain foundation, the exchanges and interactions between the residents are limited; and the Spatial Aging Adaptability of community space is particularly prominent. The problem of ageing of community space is particularly prominent. In terms of Intelligence Services, due to the lack of professional property services and information management platforms, the quality of services, management mechanisms and residents' participation are all at a low level.

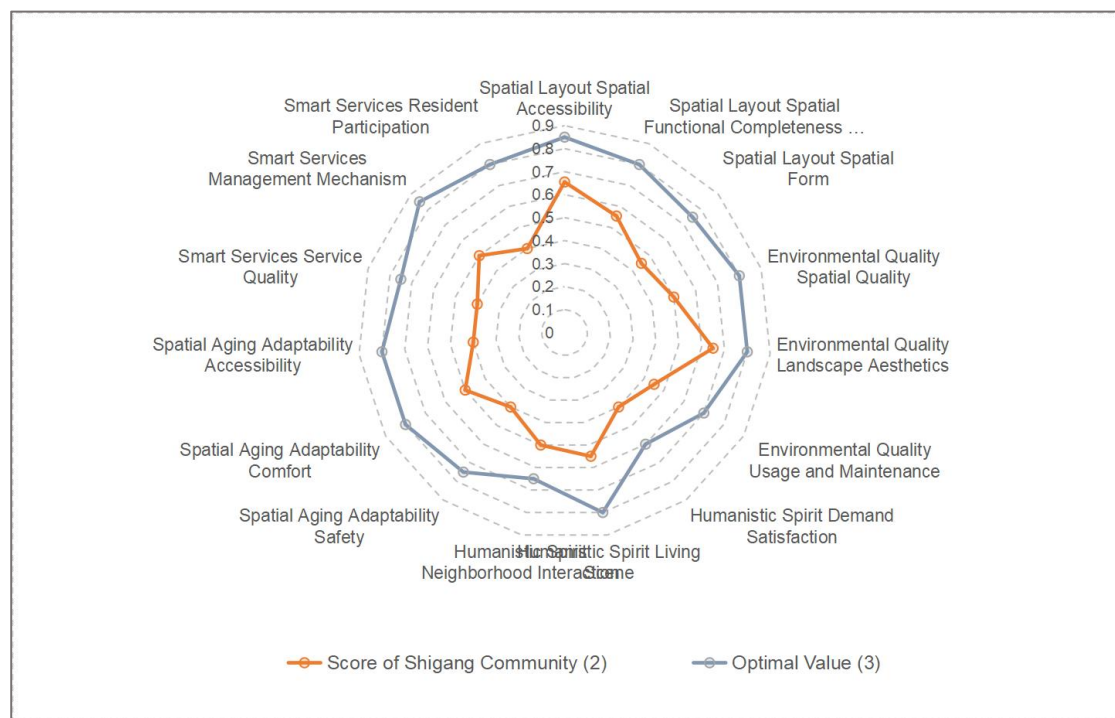


Figure 4- 30 Comparison of Evaluation Results between Shigang Community and Research Cases

(Source: author's  
drawing)

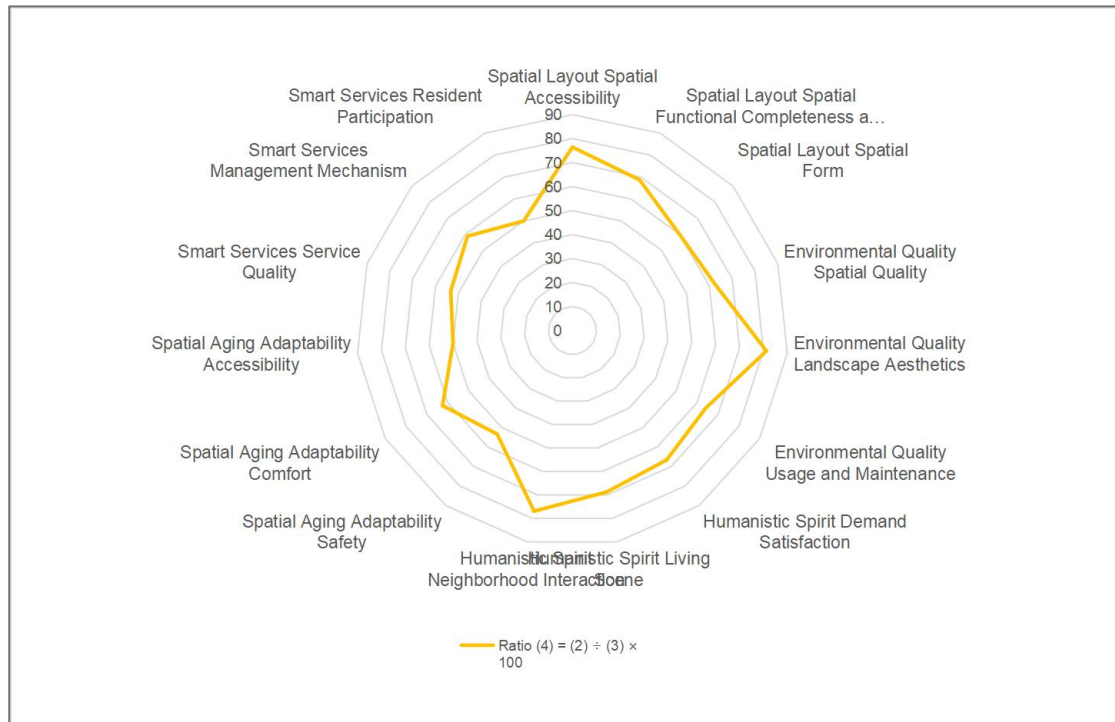


Figure 4- 31 Comparison of Evaluation Results in Different Dimensions

(Source: author's drawing)

Overall, the comprehensive evaluation score of Shigang community is 63.78 points, which is relatively average, with the main shortcomings focusing on the lack of ageing facilities, insufficient spatial connectivity, and poor cultural scenarios. There are different degrees of deficiencies in multiple dimensions of the comprehensive level, and the problems are intertwined, forming a complex and systematic community development dilemma. Therefore, the public space renewal of Shigang Community needs to start from a holistic perspective, taking into account multiple dimensions such as space, Environmental landscape, service mechanism, humanistic care, etc., so as to comprehensively improve the Quality and operational capacity of the community's public space through systematic renewal strategies and methods.

## 4.6 Summary of this Chapter

This chapter takes the Shigang community in Guangzhou as the research object, and through multi-dimensional field research and comprehensive evaluation, systematically reveals the current situation characteristics and core issues of community public space, combines material space mapping, behavioral activity

observation, residents' demand survey and comprehensive evaluation tools, and constructs a “space-behavior-perception” trinity research and analysis framework. The framework of the research and analysis is “space-behavior-perception”, which comprehensively analyzes the current state of decay and the potential for Community renewal in the Dual-aged community.

In the first part of the research, the characteristics and renewal background of Shigang Community as a typical Dual-aged community are clarified from the overview and historical development of the community. Further, through field research and questionnaires, an in-depth analysis of the physical space, behavioral activities, usage preferences and satisfaction of the community's public space was conducted. The results of the research show that the Shigang community has many problems in various aspects, which are intertwined and affect the quality of life of the residents and the overall image of the community space.

In the comprehensive evaluation part, this chapter applies the evaluation system of Complete community public space constructed in the previous section to quantitatively assess the public space of Shigang community. The evaluation results show that Shigang Community has different degrees of deficiencies in various aspects, and the evaluation clarifies the renewal priorities through weighting analysis and problem ranking.



## Chapter 5 Public Space Renewal Strategies and Methods of Dual-aged Community Under the Concept of Complete Community

This chapter focuses on the renewal strategies and methods of Dual-aged community renewal under the concept of Complete community, through the logical framework of “renewal principles - renewal objectives - renewal strategies - renewal methods”, it clarifies the basic principles and focuses of public space renewal in Dual-aged community under the concept of Complete community. This chapter focuses on the public space renewal strategies and methods of Dual-aged community renewal under the concept of complete community, through the logical framework of “renewal principles - renewal goals - renewal strategies - renewal methods”, to clarify the basic principles and focuses of Dual-aged community renewal, and to put forward the renewal goals and specific renewal strategies, to form an organic and integrated strategy framework.

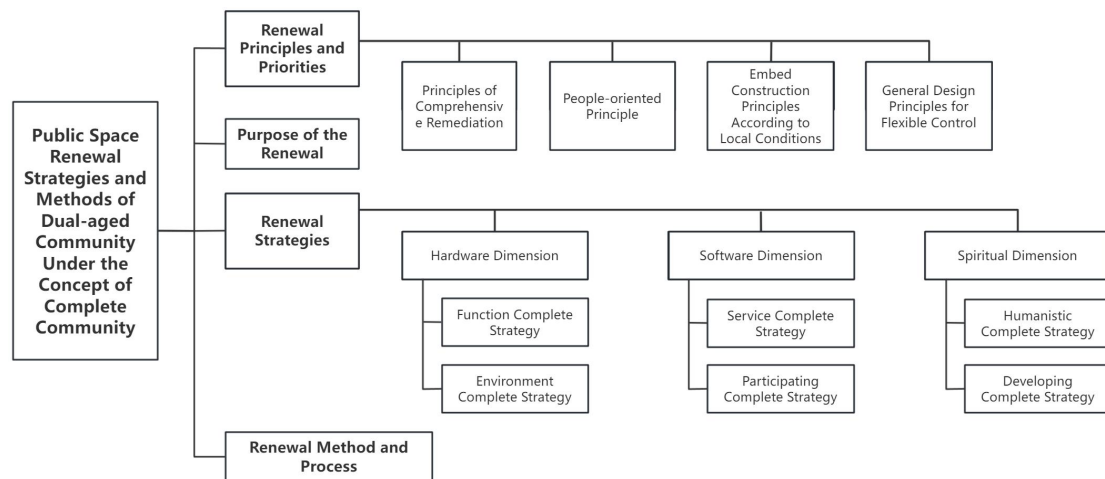


Figure 5- 1 Chapter V Chapter Structure Framework Chart

(Source: author's drawing)

From a comprehensive point of view, at present, whether the renewal of Community renewal is grasped from the macro level or from specific perspectives, the overall renewal strategy and methodology are mostly floating in the framework, and it is difficult to organically consider and integrate the multi-level and

multi-dimensional renewal system from the macro level to the micro level, as well as the diversified multi-party population structure. In addition, as the research on Community renewal activities in China is still at a relatively early stage, there is a lack of relevant theories and practical experience, and there is often an over-concentration on the material level in past renewal activities, i.e., the so-called material “order” is constructed through the intervention of “top-down” such as design and so on. “To a certain extent, it is difficult to take into account the spiritual needs, humanistic significance and later operation and maintenance of the various groups of people, and it is difficult to mobilize the enthusiasm of the community residents and other stakeholders; while the “bottom-up” renewal model, led by community residents, businessmen and grass-roots organizations, has emerged since then, although it has mobilized the community residents, businessmen and grass-roots organizations. Although the “bottom-up” renewal model has mobilized the enthusiasm and creativity of the grassroots, it has also led to contradictions at the management level and a lack of professional decision-making considerations.

Combined with the previous theories and case studies, it can be found that both the “top-down” and “bottom-up” approaches to renewal are difficult to meet the complexity of community renewal brought about by a variety of practical dilemmas, and the concept of Complete community to solve the complexity of the multidimensional and multifaceted aspects of community renewal. The concept of complete community provides a more holistic idea and framework for solving the multidimensional and multifaceted complex problems of community renewal, under which the aspects of each dimension can be considered in a comprehensive way, taking into account each other. This chapter focuses on the principles, focuses and strategies of renewal under the concept of Complete Community renewal, in order to provide a complete reference for the renewal of public space in the community.

## 5.1 Renewal Principles and Priorities

Traditional communities, especially the old communities built earlier, are often roughly divided into a single urban residential functional space area in the initial

design, and the design and reservation of public Spaces are mainly used as supporting facilities to meet the residential function, often resulting in a state of single physical space function and structural separation. With the aging of communities, Its public space can not adapt to the diverse scenes of modern urban life and the related needs of specific resident groups; At the same time, due to the early design and construction of public space in old communities, it is difficult to fully meet the needs of fixed groups of residents in different times under the modern lifestyle, that is, the material space can no longer meet the realistic and emotional needs of residents with The Times.

In today's increasingly severe aging situation, the renewal construction and operation mode of traditional community can no longer fully adapt to the realistic requirements of the current period. Therefore, the concept of complete community proposed by Mr. Wu Liangyong shows the relevance of The Times to the renewal of the current double-old community. It is imperative to renew the material environment, enrich the activity connotation, and shape the spiritual culture of the community public space. Building a complete community, improving the space quality, enhancing the neighborhood communication, and meeting the spiritual needs have become an important issue in the current urban renewal.

Table 5- 1 Comparison between “Traditional Community” and “Complete Community”

Aspect	Traditional Community	Complete Community
Planning Concept	More focused on single or a few functions, may not consider the comprehensive development needs of the community during planning	Emphasizes comprehensiveness and integrity, focusing on the coordinated development of various components, including residential, commercial, service, leisure, and transportation
Service Facilities	Service facilities may be incomplete or unevenly distributed, unable to fully meet the daily needs of residents	Provides comprehensive service facilities such as healthcare, education, culture, and entertainment to meet the diverse needs of residents
Resident Participation	Resident participation may be low, with decision-making and planning processes often dominated by the government or developers	Encourages resident participation in community planning and management, emphasizing community autonomy and resident agency
Environmental Quality	May have environmental issues such as insufficient green space and pollution problems, with less emphasis on environmental protection	Focuses on sustainable environmental development, emphasizing green spaces, ecological construction, and environmental protection
Neighborhood Relations	May have certain social divisions, with insufficient communication and integration among different groups	Promotes integration and communication among residents of different ages, cultures, and economic backgrounds

Aspect	Traditional Community	Complete Community
Aging Adaptation	May not fully consider the special needs of the elderly	Takes into account aging issues, providing age-friendly facilities and services such as barrier-free design and elderly care services
Management Services	May lack effective long-term maintenance and management, leading to the degradation of community environment and facilities	Has a sound maintenance and management mechanism to ensure the long-term stability and development of the community

(Source: compiled by the author based on relevant information)

As a special group in the social structure, the living habits and needs of the elderly are different from those of others to a certain extent. Therefore, special consideration should be given to the form, function and safety of the public space in the community where the elderly live, so as to provide a space with perfect hardware facilities and meet spiritual and cultural needs.

### 5.1.1 Principles of Comprehensive Remediation

Under the framework of the concept of complete community, the principle of integrated renewal of public space in Dual-aged community emphasizes a comprehensive and systematic approach, which covers all aspects and levels of community public space renewal. Although different aspects inevitably have some emphasis or are inclined to policy resources in actual renewal activities, However, at the level of starting ideas, it is still necessary to carry on the overall derivation and grasp with comprehensive consideration. According to the principle of comprehensive wholeness, community public space is not only a part of the physical environment, but also an important carrier of community culture, social communication and residents' identity. Therefore, any renewal activity should take into account the multiple functions of space, the diverse needs of residents, the historical and cultural background of the community and other factors, and use a comprehensive idea to carry out renewal activities.

The principle of comprehensive regulation of public space requires that in the process of renewal, the multi-functionality of space, the diverse needs of residents, the historical and cultural background of the community, sustainable development and residents' participation should be fully considered, and comprehensive ideas should be

used to carry out renewal activities, so as to realize the comprehensive improvement and promotion of community public space. To create a more comfortable, convenient and culturally rich living environment for residents.

### 5.1.2 People-oriented Principle

The core of the people-oriented principle is to take the actual needs of the elderly as the guidance, to ensure that the renewed public space can meet the basic life needs of the elderly and their psychological and emotional needs. As a special type of community, the core point of the renewal of Dual-aged community lies in its unique user group. The people-oriented principle should first fully protect the use of people.

The essence of public space is to provide life scenes, and colorful life situations are the source of community vitality. In the process of updating, ensure that all the designs are centered around the actual needs of the elderly, so as to create a space that is both beautiful and practical, and more importantly, truly serves the physical and mental health of the elderly and meets their physiological needs. For example, the design should minimize the walking distance and provide sufficient seats for the elderly to rest at any time; Given the decline in visual and auditory abilities, public Spaces need to be well lit and clearly marked; In order to prevent slipping and other accidents, the selection of ground materials and laying methods need to pay special attention to such aspects.

Secondly, in terms of service provision and user experience, people-oriented means to provide personalized and diversified services. For example, given the large individual differences among the elderly, public Spaces can be equipped with some adjustable facilities, such as tables and chairs with adjustable height, or lights that can be adjusted according to personal preference.

### 5.1.3 Embed Construction Principles According to Local Conditions

The renewal of old communities is different from the style of large-scale demolition and construction in the period of large-scale urban construction, and is affected and restricted by realistic conditions such as capital, project amount and

residents. Therefore, the actual situation and needs of the local should be fully considered to realize the reasonable layout and effective service of elderly care facilities.<sup>[92]</sup> The renewal of community space and the addition of elderly care service facilities should be based on the actual situation of the community, adhere to the problem-oriented, focus on ensuring the supply of basic services, and supplement and improve the existing shortcomings of the community. By determining the land use index and construction scale according to local conditions, the service capacity and coverage of community elderly care service facilities can be effectively improved. So as to better meet the diverse needs of the elderly. For example, differentiated planning and construction indicators for elderly care facilities should be formulated according to factors such as the level of local economic development, the degree of population aging and distribution characteristics. In regions with relatively developed economy, dense elderly population and strong demand for care services, the allocation standards of elderly care facilities can be appropriately improved to meet the diversified needs of local elderly people.

Secondly, at the level of material construction, the scale and type of construction should be reasonably determined according to the specific situation. For areas with abundant space and space and large service demand, large-scale comprehensive elderly care facilities of moderate scale can be built to improve the use efficiency and operation effect of facilities. In areas where space is limited but service needs exist, the experience of Japan can be used for reference, and small-scale and community-embedded pension facilities can be actively developed. Large facilities can be divided into multiple small facilities and dispersed in communities with dense elderly population, so as to better achieve the goal of elderly people getting nearby pension services.

In addition, the regional synergy of elderly care facilities should be fully mobilized. Through scientific policy design, resources sharing and complementary advantages between different elderly care facilities are promoted to improve the overall service level and operational efficiency. For example, the activity space and elderly care facilities are allowed to provide services across administrative regions in

neighboring regions to solve the problem of uneven access to services for the elderly in different regions; At the same time, the "large with small" facility configuration mode is introduced, so that the construction of large and medium-sized and the surrounding small areas can support each other and develop in synergy, and jointly create a better and convenient elderly care service environment for the elderly.

#### 5.1.4 General Design Principles for Flexible Control

The compatibility of community public space renewal is particularly important in the background of objects with complex actual conditions and diverse difficulties in old communities. The actual situation of each community is different, and the constructable space is also different. The principle of universal design of flexible regulation emphasizes the flexibility and adaptability of space to meet the needs of different residents and cope with possible future changes. In the process of design and renewal, the variability and versatility of space are required to be fully considered, so that public space can be flexibly adjusted and optimized according to the use of residents and the development needs of the community, so as to realize the sustainable use and development of space. This principle is also of great significance for the renewal of community public space.

Elasticity means that the spatial level is more flexible and changeable, which can effectively reduce the construction scale and construction investment. For example, in the space layout design, modular design and movable partition are used to achieve flexible space separation and combination. The public space is divided into a number of independent functional modules, each module can be arranged and used according to different activity needs, such as the activity center is designed into a number of small rooms that can be combined to meet the needs of different scale and nature of activities; At the same time, the setting of movable partition allows the space to be quickly adjusted according to the actual use, improving the utilization rate and flexibility of the space, such as the movable partition wall can be divided into different areas according to the scale of activity.

In addition, the facilities in the public space should be versatile and mobile to

adapt to the needs and activities of different residents. Some facilities such as fitness equipment and green plants can be designed into a mobile form, convenient according to the use of residents and spatial layout changes to adjust, such as removable base fitness equipment can be flexibly adjusted according to demand and quantity. At the same time, the design of public space should fully consider the adaptability of the environment, including climate adaptability and seasonal adaptability, so that the space can adapt to different climatic conditions and provide comfortable activity environment for residents.

## 5.2 Purpose of the Renewal

Under the concept of complete community, the renewal goal of public space in Dual-aged community aims to realize the comprehensive upgrade of community space through systematic transformation and optimization, so as to meet the diverse needs of the elderly, improve their quality of life, and promote the sustainable development of the community through the strategic supplement of the integrity of six aspects: function, environment, service, participation, humanity and development. To realize the unity, coordination and complete construction of community public space in the three dimensions of hardware, software and spirit.

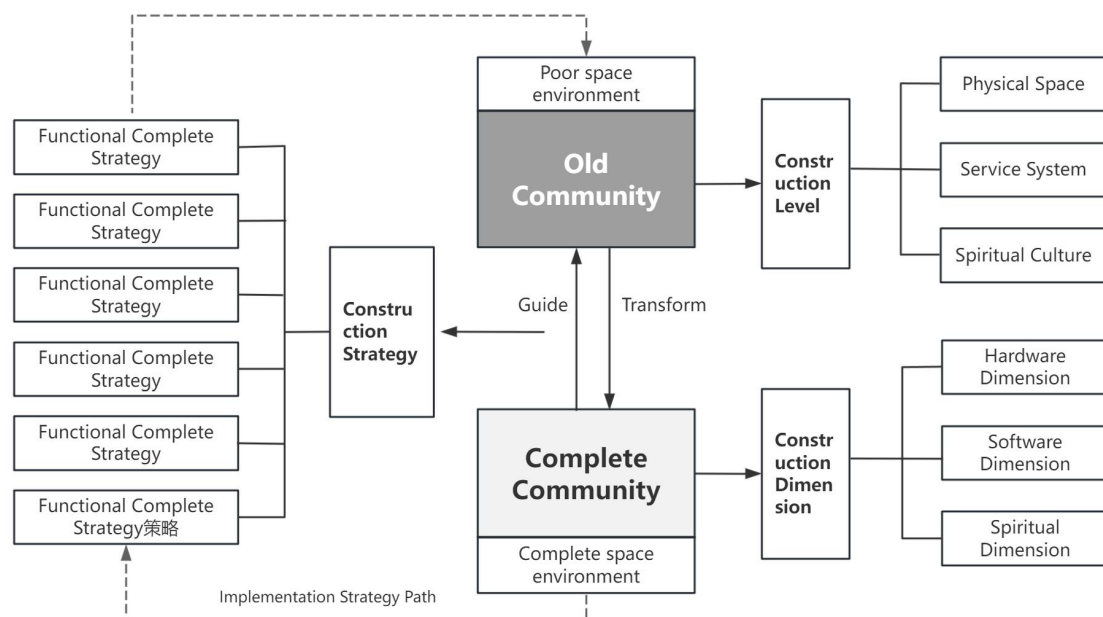


Figure 5- 2 Theoretical framework of Public Space Construction from the Perspective of Complete Community



(Source: author's drawing)

At the goal level, it can be broken down into several aspects. The first is the improvement of space quality and function, that is, the material environment quality of community public space is significantly improved. Including improving the rationality of spatial layout, ensuring the connectivity and accessibility of public Spaces, making them more convenient and safe; Updating and upgrading existing facilities to eliminate problems of age and breakage and ensure their normal operation and use; In addition, increase the construction of barrier-free facilities, such as barrier-free access, handrails, low facilities, etc., to provide convenience for special groups such as the elderly and the disabled, and ensure the safety of travel and activities. Through corresponding measures, the community public space can be made more beautiful, comfortable and practical, meet the basic living needs and leisure and entertainment needs of the elderly, and improve their quality of life and happiness.

Secondly, the renewal goal is to enrich the cultural connotation and spiritual life of the community public space. Community public space is not only a part of the material environment, but also an important carrier of community cultural inheritance and residents' spiritual life. In the process of renewal, attention should be paid to exploring and inheriting the history and culture of the community, demonstrating the development process and cultural characteristics of the community, enhancing residents' sense of identity and belonging to the community, organizing diversified cultural activities, such as cultural performances, art exhibitions, cultural lectures, etc., providing residents with rich cultural experience and exchange opportunities, and meeting their spiritual and cultural needs. Promote the prosperity and development of community culture, make the community public space become the paradise of residents' spiritual life, and create a living environment full of cultural atmosphere and life interest for the elderly residents.

In addition, the renewal aims to enhance the cohesion and vitality of the community. Community public space is an important place for residents' social interaction and community activities, and its renewal should promote communication and cooperation among residents and enhance neighborhood relations and community

cohesion. By optimizing spatial layout and functional configuration, more communication platforms and activity Spaces are provided for residents, residents are encouraged to participate in the planning, construction and management of community public space, play their main role in the process of community renewal, make community public space become a space for residents to participate and share, promote the harmonious development of the community, and stimulate the vitality and vitality of the community.

The renewal goal also focuses on the sustainable development and long-term maintenance of the community public space, which can be sustainable organic renewal and development, fully considering the future development needs and changing trends of the community, and ensuring the long-term use and maintenance of public space. Establish a sound management mechanism and service system, clarify management responsibilities and maintenance standards, ensure that the daily maintenance and management of public space is in place, and pay attention to the coordination and integration of community public space and the surrounding environment, promote the sustainable development of the community, and create a long-term stable, harmonious and beautiful living environment for residents.

### 5.3 Renewal Strategies

Under the guidance of the concept of complete community, the scenario-oriented renewal strategy of public space in old communities aims to realize the comprehensive upgrade of community space through systematic transformation and optimization, so as to meet the diverse needs of the elderly, improve their quality of life, and promote the sustainable development of the community. The integrity of community space is the key to achieve the goal of renewal, and the complete community public space not only includes various components of the physical environment, such as public facilities, green space, transportation network, etc., but also includes the cultural, social and management levels of the community, as well as the construction of community culture and residents' spiritual civilization. Therefore, the proposed strategies should not only focus on the improvement of the physical

environment, but also emphasize the inheritance of community culture, the enhancement of resident participation, and environmental sustainability. Specifically, the renewal activities should be committed to building the overall integrity of the community, covering six aspects of functional integrity, environmental integrity, service integrity, participation integrity, humanistic integrity and development integrity, and derived from this, the corresponding renewal strategies, these strategies are interrelated, and jointly build a comprehensive renewal framework. Ensure the coordinated development of community public space in the three dimensions of hardware, software and spirit.

The application of relevant strategies in the three dimensions of hardware, software and spirit ensures the comprehensive and complete updating activities of community public space. In terms of hardware, the level of physical environment and facilities of public space is improved through the strategy of functional integrity and environmental integrity. In terms of software, through the strategy of service integrity and participation integrity, the community's service ability and residents' participation are enhanced. From the spiritual dimension, through the strategy of humanistic integrity and development integrity, the cultural connotation and sustainable development ability of the community are enhanced. By summarizing multi-dimensional and multi-level comprehensive renewal strategies, the public space of the community can be comprehensively improved and optimized, which not only meets the diversified needs of the elderly and improves their quality of life, but also promotes the sustainable development of the community, enhances the cohesion of the community and the happiness of residents, and provides useful reference for the renewal of other similar communities.

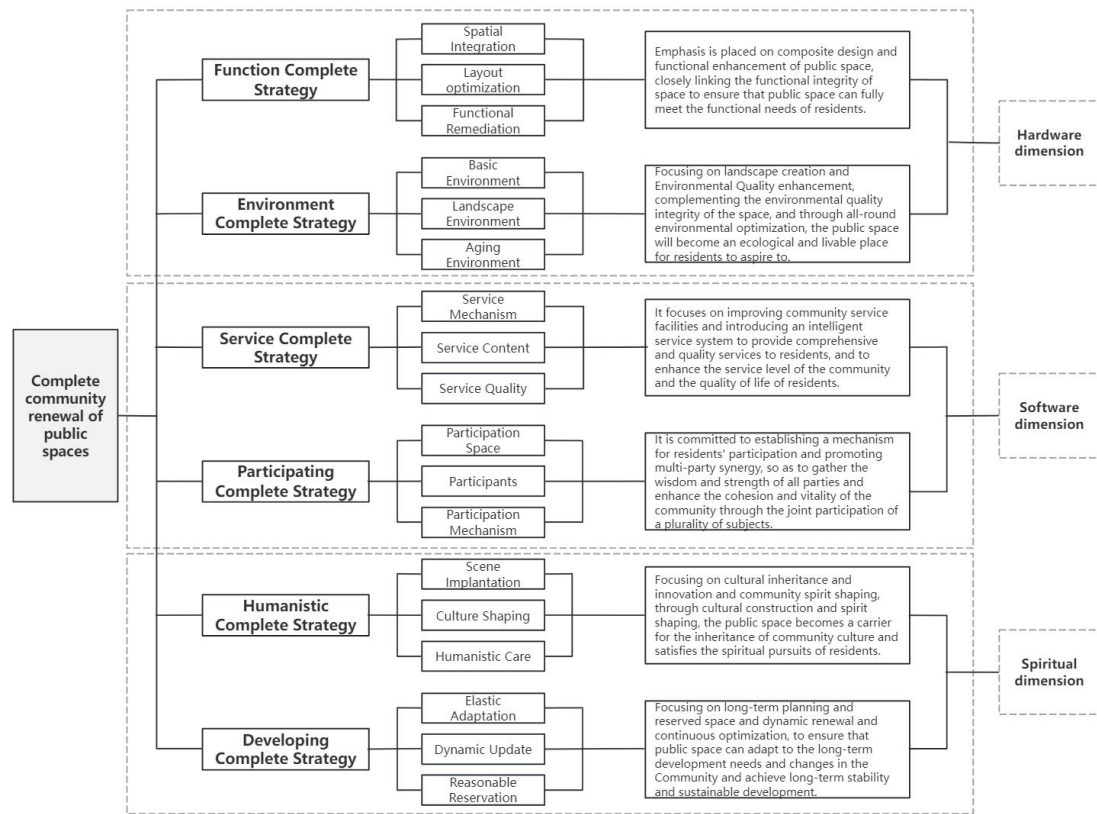


Figure 5- 3 Diagram of the Integrity Construction and Mechanism of Community Public Space  
Renewal  
(Source: author's drawing)

### 5.3.1 Function Complete Strategy

Functional integrity strategy focuses on the integrity, diversity and adaptability of community public space. The existing space is re-evaluated and designed to meet the diverse needs of different groups and different time periods. Functional attribute is one of the most basic and important characteristics carried by the physical space of the entity, so the strategy of functional integrity is also the key path to realize the comprehensive upgrade of community public space and meet the diversified needs of residents. The renewal strategy should start from the three levels of spatial integration, layout optimization and functional remediation, so as to build a public space system that not only meets the current needs but also has future adaptability. Among them, spatial integration is the foundation, combing and integrating scattered, idle or overlapping Spaces in the community, breaking physical boundaries, forming a continuous and open space network, improving space utilization efficiency and

enhancing community cohesion; Layout optimization is the key. Reasonable spatial layout ensures the coordination and complementarity of different functional areas, reduces use conflicts, and connects various functional Spaces such as leisure, sports, social and cultural Spaces to form an organic whole and meet the diversified needs of residents. Functional remediation is an important link. In view of the high proportion of elderly population and many special needs in Dual-aged communities, as well as the current situation of inadequate public space facilities, facilities suitable for aging and cultural activities are added to fill the functional gaps and improve the quality of space.

### 5.3.1.1 Spatial Integration

#### (1) Overall Planning of Community Public Space

In the process of updating the public space of Dual-aged community, it is necessary to always consider the constraints of the severe reality. The current situation of the public space is restricted by the early design and years of use, and it is in a state of chaos and fragmentation. Therefore, the first step of the spatial integration strategy should be to start from the whole and integrate the public space according to different levels. The chaotic public space is reorganized according to different levels, and the overall spatial hierarchy system is improved. For example, the existing space is integrated through the classification of points, lines, planes, or central nodes, sub-central nodes, and ordinary nodes. At the same time, attention should be paid to establishing the relationship between various spatial levels, improving its correlation degree and accessibility, and improving the overall space utilization efficiency of community public space.

The core space nodes can be renewed with emphasis to create a scene business card of community public space. The core space nodes can drive the renewal of secondary nodes and ordinary nodes, and the corresponding functional characteristics and use degree of nodes at different levels can be allocated through different updating efforts and facility placement. It is helpful to provide a long-term reference for the long-term process of renewal of old communities.

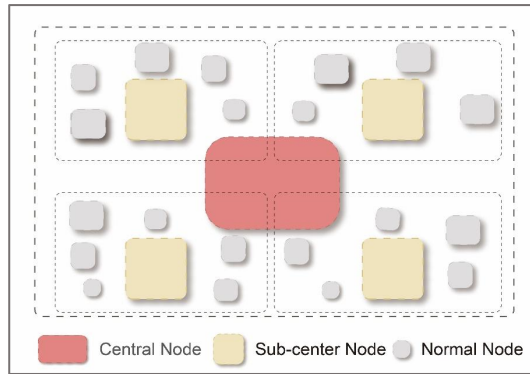


Figure 5- 4 Improve Spatial Hierarchy

(Source: author's drawing)

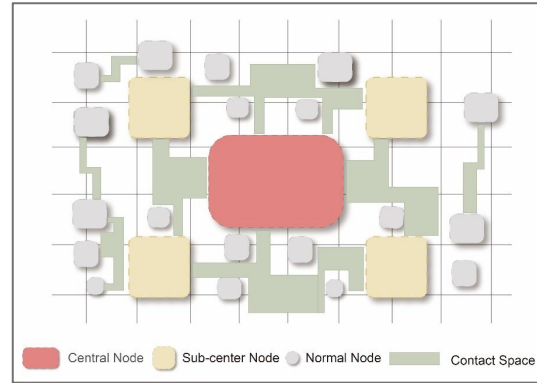


Figure 5- 5 Enhance Spatial Connection

(Source: author's drawing)

## (2) Explore Space Potential and Expand Space Carrying Capacity

At the layout level, the public space of the community is also faced with the problems of insufficient capacity, lack of space, low utilization efficiency and space waste. Therefore, the public space of the old community also has a large amount of space potential to be explored, and there are often some neglected idle land in the community, such as abandoned corners and illegally occupied Spaces. From the perspective of the current situation, the utilization of public space is low in various degrees due to various reasons. In the actual renewal, the possibility analysis should be carried out according to specific problems and the corresponding methods should be adopted to expand the space potential. From the perspective of space bearing capacity, the exploration of space potential can effectively increase the upper limit of bearing capacity and greatly increase the overall capacity of community public space.

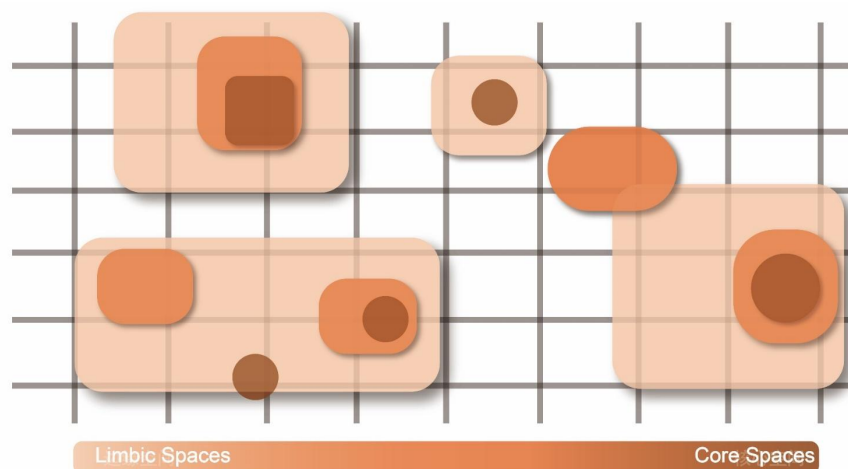


Figure 5- 6 Explore the Potential of Space

(Source: author's drawing)

The core public space is highly identifiable, while the corresponding edge space is relatively inadequate in terms of use degree and environmental quality. Give full play to the main role of the core space node and the sub-central node, promote the quality potential of the surrounding edge space with its renewal and development, and continue to expand outwards at the spatial level, so as to fully explore the exploitability of the public space inside the community, to achieve the integrity of the space bearing level.

### (3) Integrate the Debris Space to Create Spatial Continuity

A large number of scattered, idle or inefficient Spaces in old communities restrict the perfection of public space functions, and also affect the exploration of the potential of marginal space and the continuity of the overall space system. Therefore, it is necessary to effectively integrate scattered space resources through systematic planning and design strategies, create a coherent and smooth space experience, break the space division, and realize the organic connection and functional complementarity of space.

The continuity of space has an important impact on the accessibility and vitality of public Spaces in old communities. For under-utilized or single-function fragmented Spaces, detailed assessment should be carried out first, and physical partitions between Spaces should be broken down, such as unnecessary walls, fences or buildings, to connect the originally dispersed Spaces. A larger, continuous network of public Spaces should be formed. At the same time, a coherent path should be adopted at the design level to connect various public Spaces and guide residents to form a continuity in the activity route.

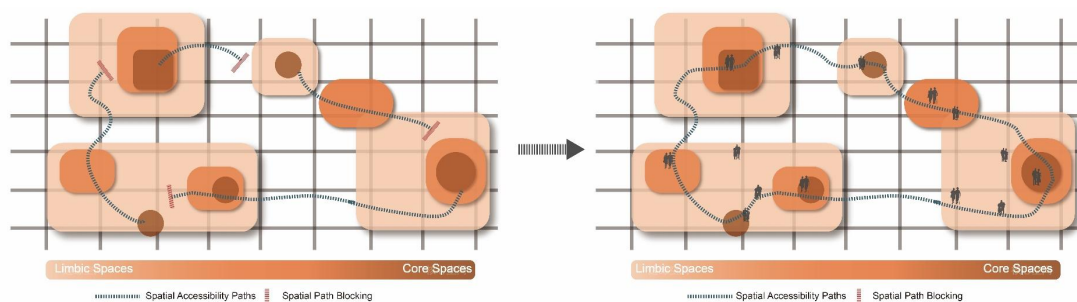


Figure 5- 7 Integrate Fragmented Spaces to Create Spatial Continuity

(Source: author's drawing)

#### (4) Spatial Expansion of Complex Dimensions

The current situation and future renewal strategies of public space utilization in traditional old communities tend to focus on the existing ground activity space, while ignoring the vertical and other dimensions of community space utilization. The spatial dimension of the old community is relatively simple, but there is still a lack of complex spatial potential such as the overhead gray space and the vertical spatial dislocation formed by low buildings. The full development of it can realize the maximum utilization of space. In addition to providing traffic functions, the overhead space on the ground floor can also be used as the fuzzy feature of gray space transition between indoor and outdoor Spaces to meet the public activities of residents in specific periods or weather conditions. The roof space becomes a neglected object in the renewal of the old community. Through the reinforcement of its safety performance, it can be transformed into a green leisure area or community garden, which can be used as a place for residents' daily activities or life use. At the same time, energy facilities can be added to it to exert the use value outside of residents' activities. In the community, there are often low squares at the bottom or first floor, and the roof platform is relatively accessible for the elderly, which can be used as a supplement to the ground activity space. In addition, for the adjacent residential buildings, it can also pay attention to the horizontal connection of the roof space to a certain extent, expand the activity area, and form a composite three-dimensional fifth facade public space.

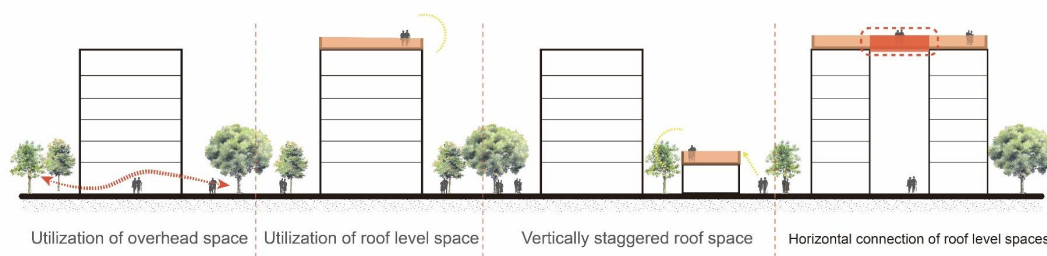


Figure 5- 8 Spatial Expansion of Composite Dimensions

(Source: author's drawing)

In addition to expanding the capacity of public space, the spatial expansion strategy of composite dimension can also improve the overall quality of the



community, the quality of life of residents, and enhance the connection of the overall spatial dimension, so as to create a more comfortable, convenient and vibrant life activity scene for residents.

### 5.3.1.2 Layout Optimization

#### (1) Improve Spatial Recognition

The chaotic layout of community public space affects residents' accurate recognition and cognition of space functions in the process of use. In other words, users' activities in the process of activity are guided by their visual feelings, while the state and recognizability of space affect users' visual feelings, and the visual experience in turn dominates the occurrence of activity behaviors. In the renovation, attention should first be paid to the shaping of the iconic elements of the space. Through unique architectural sketches, landscape installations or theme sculptures, a visual focus with recognition can be formed to help residents and visitors quickly identify and remember the space. For example, in combination with the historical culture and regional characteristics of the community, public art works or theme landscape nodes with symbolic significance are set up to strengthen the cultural attributes and identity of the space. Secondly, we should optimize the collocation of space color and material, create a unique space atmosphere through the bright color system and the use of rich texture materials, so that different functional areas have a clear distinction and guidance.

For the original illegal additions or alterations in the site with limited public space resources, the renovation should be carried out based on the criteria of improving the accessibility of public view and the identification of space. On the premise of retaining the existing building texture, the buildings occupying the public space should be demolished, and the public space should be re-planned and functionally configured. For existing enclosed buildings, the enclosed structure of their space can be retained to maintain the connectivity and privacy of the space. In the process of renewal, the space environment can be further enriched and the comfort and practicality of the space can be improved by adding green plants, seats, fitness

equipment and landscape facilities.

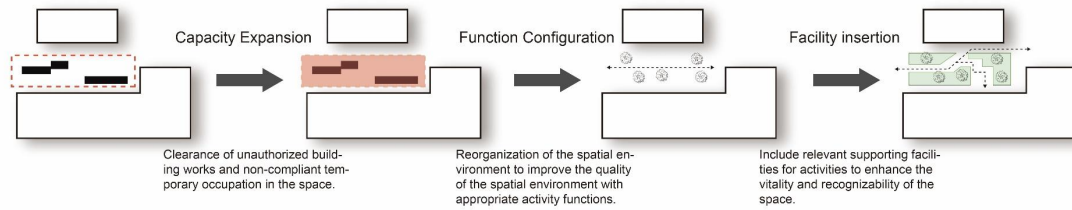


Figure 5- 9 Improve Spatial Recognizability

(Source: author's drawing)

Improving the recognition of community public space can make it more convenient, intuitive and comfortable for residents to use the space, and at the same time can enhance the cohesion and cultural atmosphere of the community. This strategy measure not only improves the practicality and aesthetics of the space, but also provides residents with a living environment rich in cultural connotation and emotional belonging.

## (2) Continuation of Flexible Spatial Layout

The renewal of public space in old communities is different from the urban design and construction mode of large-scale demolition and construction, and its basic spatial conditions such as form and location are generally difficult to make major changes. Therefore, the continuation of the flexible and diverse spatial layout form of the community itself is the key strategy to achieve the diversification of spatial functions and the integrity of adaptability.

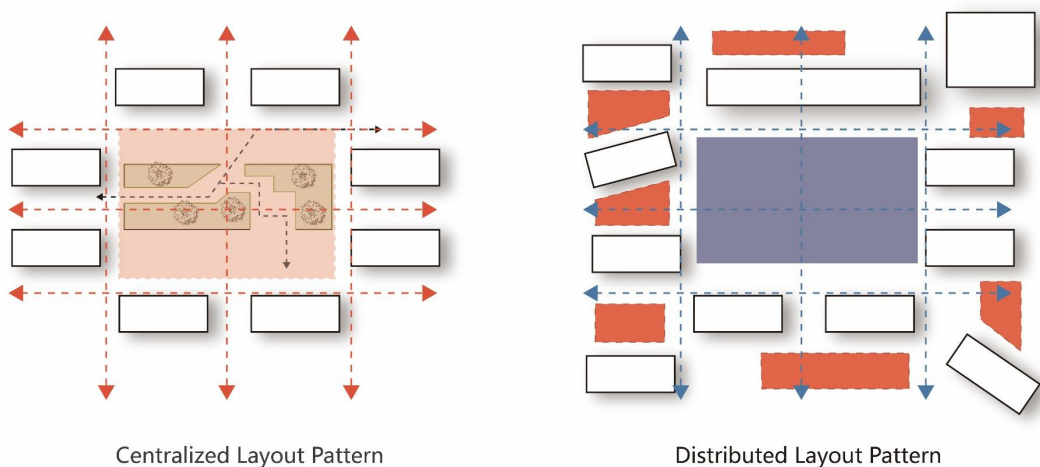


Figure 5- 10 Continuing the Flexible Spatial Layout

(Source: author's drawing)

As for the centralized space, facilities with high frequency of use can be configured here by taking advantage of its characteristics of large radiation surface and strong accessibility, and the core space can be built as a landmark place by giving emphasis to resource tilt and key construction in the updating process, so as to facilitate the sharing of space, facilitate future management and maintenance, and promote interaction and communication among community members. For the space with scattered and fragmented layout of the community, the corresponding functions and renewal contents can be flexibly distributed according to the existing spatial forms and facilities, such as the distribution of pocket parks or fitness facilities in the community, convenient for residents to use nearby, meet the diversified needs of residents, and make the overall spatial layout system systematic and grid.

#### 5.3.1.3 Functional Remediation

##### (1) Coherence and complementarity of spatial functions

The public space in the old community is often not designed with rigorous functional judgment at the initial design level, so the functional theme of the space is still not clear and the series between the Spaces is weak. Therefore, in the renewal strategy of functional sections, it is necessary to first clarify the functional attributes that the core public area should possess and adapt to, and renewal the actual functions given to it based on the actual situation and use of the space, so as to ensure that the public space inside the community can be fully utilized regardless of its actual situation, and at the same time pay attention to the complementarity and coherence of spatial functions. In order to enhance the overall vitality and efficiency of public space, public space can be configured with corresponding functions according to its different forms, areas and locations and other factors, and through systematic planning, these independent Spaces are organically connected to form a continuous and complementary whole.

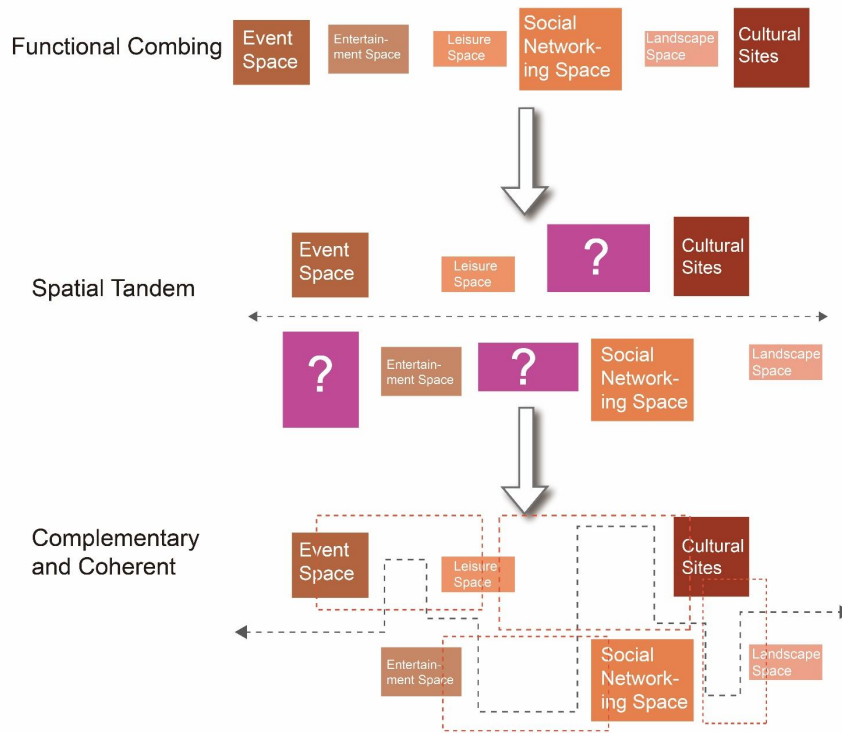


Figure 5- 11 Coherence and Complementarity of Spatial Functions

(Source: author's drawing)

Different functional areas can be connected through the pedestrian system, landscape corridor and open space nodes, forming a continuous moving line and a complete spatial network. Greening, pavement changes, landscape pieces and other design techniques can be used to weaken the boundaries between functional areas and achieve functional and spatial complementarity. In addition, the use needs and behavioral characteristics of different groups should be considered, and small nodes and guidance systems should be set in the spatial series to ensure the continuity and encirlement of the space. Through fine zoning and organic connection, it can create a diverse, coherent and vibrant public space and promote community communication and interaction.

## (2) Functional shared space

The current single functional zoning model of community public space may also limit residents' activities and enthusiasm to a certain extent, so that it cannot serve all the people with maximum efficiency. Considering the constraints of space constraints in old communities, the functional complexity of existing Spaces should be enhanced

in the renewal process, and the composite integration of existing facilities and space resources should be strengthened. By means of functional replacement, appropriate renovation and expansion or spatial association, a multi-functional integration and composite intensive interactive space should be created. For example, flexible space layout and diversified facility configuration can be considered in the renewal of the community space core node plaza, and the design to meet diverse needs can be implanted in the limited site. In daily life, it can be used as a place for residents to rest, exercise and socialize, and in holidays, it can be flexibly transformed into a market or a performance venue to realize dynamic switching of space functions. For different functional areas, the organic series should be realized through landscape greening, walking system and shared nodes to form a composite space system with suitable static and dynamic functions and complementary functions.

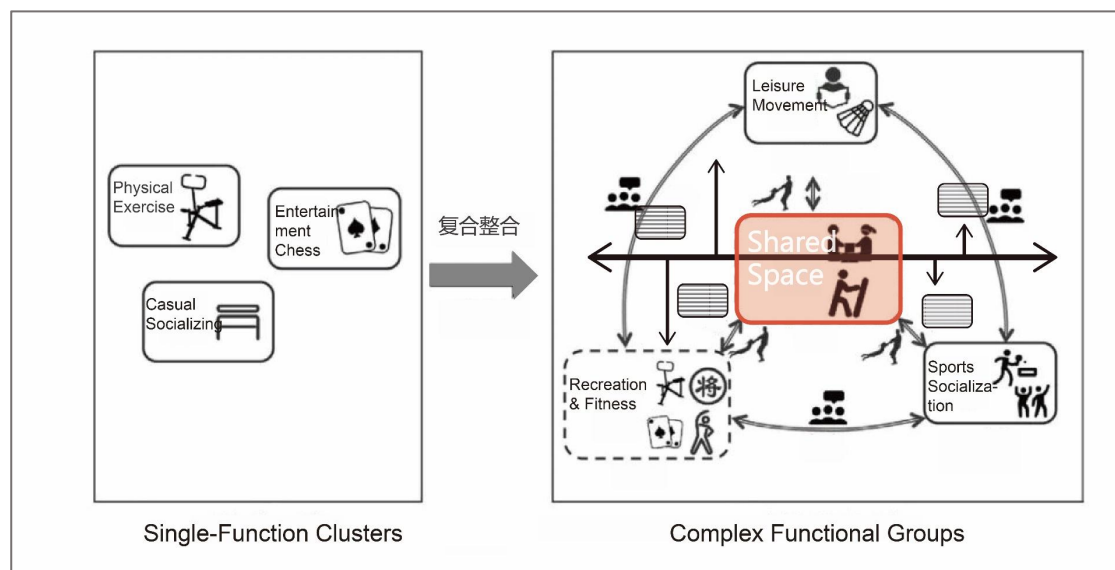


Figure 5- 12 Multifunctional Shared Space

(Source: author's drawing)

In addition, it can be seen from the previous research content that even residents of the same generation have certain differences in physical and mental functions, hobbies, activity time, space needs and other aspects. Therefore, the renewal of public space in old communities should be subdivided into different groups' demand differences, considering the time dimension of shared space use and the specific activities mainly carried by different periods. An inclusive design approach is adopted to meet the needs of different groups within the same space domain. The composite

functional space design can not only improve the efficiency of land use, but also stimulate the vitality of space, promote the interaction of residents, and enhance the overall value and use experience of public space.

### 5.3.2 Environment Complete Strategy

The environmental integrity strategy focuses on the ecology, aesthetics and comfort of community public space, and is committed to creating a community environment that not only satisfies a good ecological environment but also has aesthetic value and living comfort. Through systematic and comprehensive optimization means, it creates a comfortable, safe, green and inclusive living environment for residents, which is an important path to promote the improvement of the quality of community space. The specific implementation strategy is carried out from three dimensions: basic environment improvement, landscape environment beautification and aging environment optimization, in order to build a public space environment system that can meet the needs of residents' quality of life and has long-term ecological benefits.

Among them, the basic environment improvement is the premise, through the improvement of infrastructure such as roads, lighting, to ensure the basic function and safety of the community environment; Landscaping is the core, increase greening, create a good landscape style, enhance the community's environmental comfort and landscape atmosphere, enhance the sense of belonging of residents; The optimization of the elderly environment is the focus, the implementation of barrier-free design, the addition of rest facilities and safety protection, special attention to the special needs of the elderly group, to ensure the safety and comfort of their activities, so as to comprehensively improve the overall quality of the community environment.

#### 5.3.2.1 Basic Environment

##### (1) Overall Improvement of Infrastructure

Infrastructure such as road surface, lighting system and activity facilities in community public space have been damaged to varying degrees after years of use, and

the basic environment, as the cornerstone of building a comfortable community life, is the basis for promoting the integrity of community public space environment. At the specific implementation strategy level, in addition to the repair and improvement of various facilities, the basic environment of the corresponding space can also be renewed according to the relevant space types in the functional integrity strategy mentioned above.

For example, in view of the status quo of aging leisure facilities and damaged shelter facilities in the public space of the core node of the community center, the original old color steel ceiling can be removed, and the adjustable canopy can be re-set to provide rain shelter function while ensuring that the space can still provide sufficient sunshine in sunny days. The original abandoned and damaged buildings will be demolished and transformed into public rest Spaces, and the old pavement will be soft-fitted to provide safer protection and good psychological feedback.



Figure 5- 13 Schematic Diagram of the Update of the Public Space of the Community Core Node  
(Source: author's drawing)

As for the corner space where the community connects with the street, the enclosed pocket space is used as the transition space between the community and the street interface. With the help of the concept of pocket garden, plants, flowers, leisure seats and other facilities are placed. Part of the wall will be removed to create a landscape to enhance the transition guidance, and part of the wall will be transformed into a hollow landscape wall or a community display wall.





Figure 5- 14 Community Pocket Node Public Space Renewal Diagram

(Source: author's drawing)

For corner Spaces with weak community accessibility, dynamic functions such as residents' exercise and health care can be added to improve relevant supporting facilities in view of the low frequency of space use. At the same time, it can be used as a site for gathering movement behaviors (such as square dancing) to enhance the vitality of corner Spaces.



Figure 5- 15 Schematic Diagram of the Public Space Renewal at the Corner Nodes of the Community

(Source: author's drawing)

## (2) Construction of Slow-Walking Friendly System

Another important requirement in the basic environment is the creation of the community's overall chronic system. Due to the space shortage in the community, some nodes in the public space system are also occupied as parking lots, which makes it inconvenient for elderly residents to carry out slow walking activities in the community. In addition, the lack of a closed and accessible slow loop and related path guidance also hinder the construction of the slow walking system. The superposition



of unfavorable factors makes the elderly residents in the community more inclined to carry out activities in a specific space, rather than taking advantage of the transportation system of public space for walking and other sports.

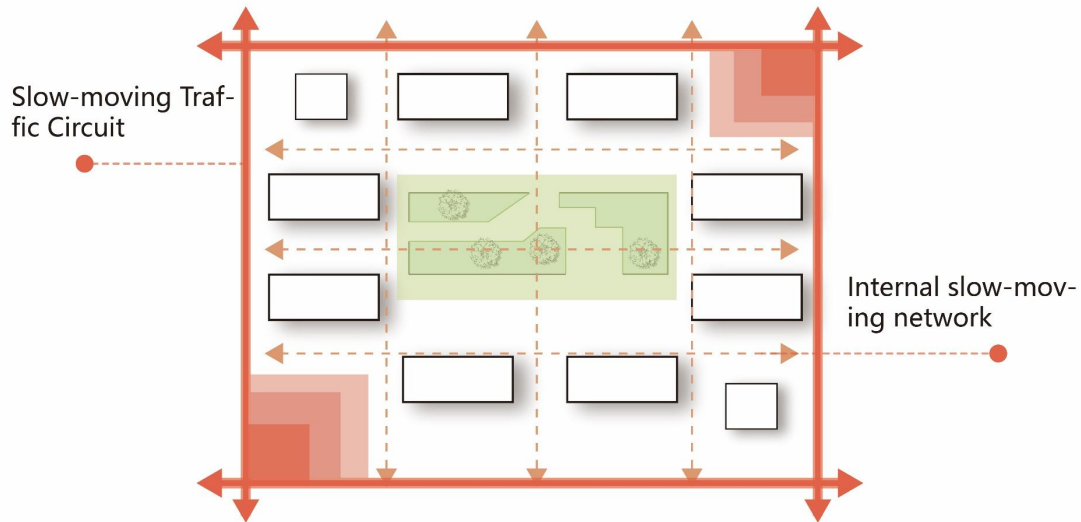


Figure 5- 16 Construction of Slow-Moving Friendly System

(Source: author's drawing)

At the level of implementation strategy, in addition to the repair and improvement of traffic space infrastructure, more attention should be paid to the construction of the overall system, reasonable planning of the priority of slow walking activities such as walking and slow walking, guiding community residents and visiting family members to park and manage vehicles in a centralized manner, reducing traffic conflicts and security risks, and releasing the walking vitality of public space. For the walking network within the community, accessibility, reasonable and comfortable distance and scale should be ensured to form an open and pleasant walking network. In addition, in order to build an integrated slow walking system in the community, the key to the implementation of the strategy is to ensure a circular slow walking loop formed in the peripheral space of the community. The circular peripheral slow walking path ensures the active use and organic connection of the various Spaces in the community, and promotes the complete construction of the overall community environment.

## 5.3.2.2 Landscape Environment

## (1) The Progressive Landscape Construction Strategy of "Point to Surface"

Based on the combing of the community landscape style and material environment in the previous research section, the corresponding landscape construction strategy of "point with surface" is formulated in combination with the basis of the fragmentation of spatial form and the scattering of landscape elements in the site. In other words, the landscape points contained in the public space of the community, such as a large number of ancient trees and scattered landscape flower ponds, are taken as the smallest unit of landscape environment style construction, and relevant design techniques are incorporated into the modular design strategy to become the vitality point of the public landscape environment of the community. First, the basic landscape points are renewed and built with emphasis. The linear connection between the points and the series between the public space areas can improve the utilization efficiency of the area space, and on this basis, a progressive landscape construction strategy can be formed, and the landscape style of the community public space can be stably and organically woven and connected.

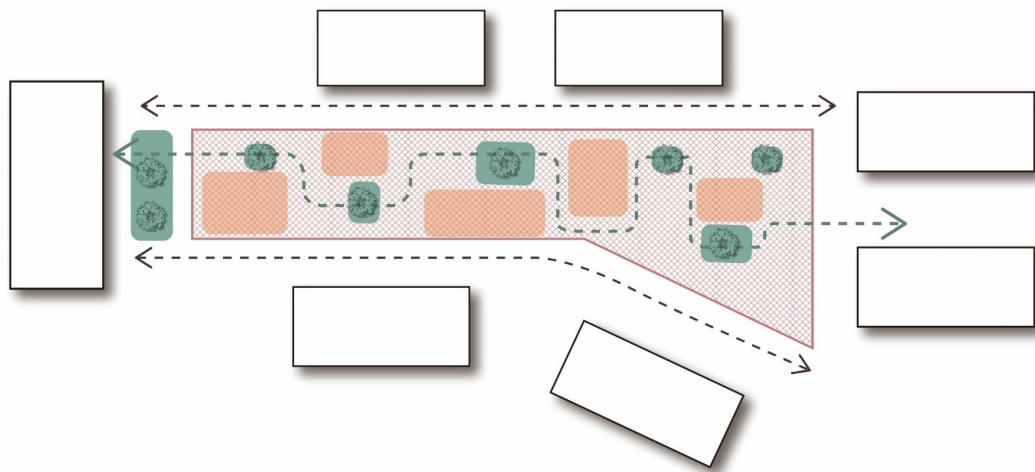


Figure 5- 17 "Using One Point to Lead the Whole" Progressive Landscape Construction

(Source: author's drawing)

For the renewal and creation of the smallest landscape points, it can use its large number and wide distribution characteristics to implant different design units, form a diversified grass-roots spatial level, and enrich the overall landscape environment

structure.

## (2) The Use of Technology to Upgrade the Landscape Style

The landscape space inside the community is mostly in a state of simple spontaneous maintenance and lack of overall guidance design. Therefore, it is inevitable to carry out large-scale renewal and transformation for the renewal and construction of the landscape style system. Therefore, in the new renewal activities, the current technology can be combined to improve the landscape style, while achieving the practical attributes of community greening, to achieve the harmonious and unified promotion of material style and ecological style. In terms of specific application, for example, combining the renovation of community spatial infrastructure with the practice of combining the area-like public space with rain garden, it not only provides landscape value, but also improves the stormwater capacity of community public space, and also has a positive effect on the daily maintenance and sustainable development of landscape system.

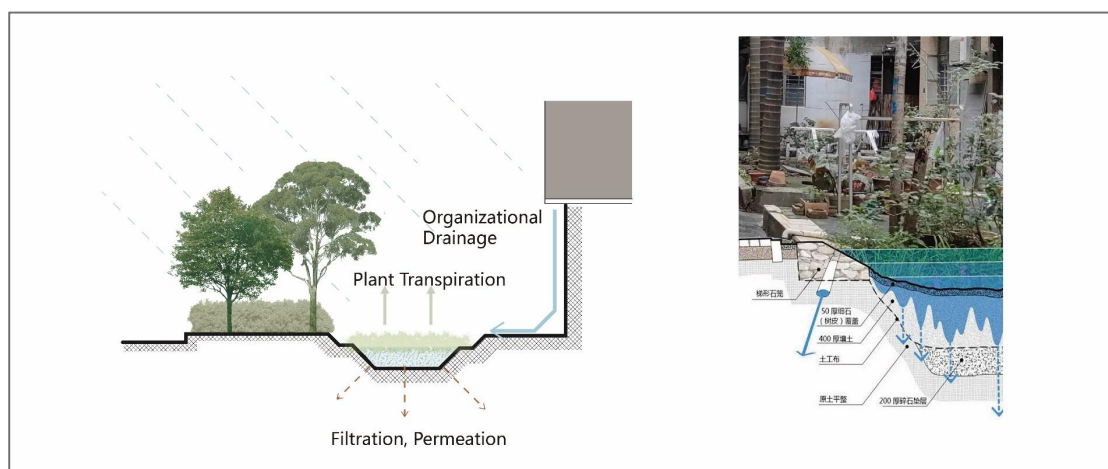


Figure 5- 18 Rain Garden Model Diagram and Large-Scale Drawing

(Source: author's drawing)

At the specific implementation level, the open space between the buildings can be used to create a rain garden. Some of the green Spaces in the garden can be recessed to facilitate rainwater collection and treatment. At the same time, steps and rest facilities can be set inside to form a composite community space with functions of rainwater treatment, landscape and use. While taking into account the landscape, it can also provide feasibility for solving the problems of rainwater discharge and

flooding.



Figure 5- 19 Schematic Diagram of Rain Garden Landscape Node Update

(Source: author's drawing)

### 5.3.2.3 Aging Adaptive Environment

#### (1) Holistic and Convenient Construction of Ageing Adaptive Environments

Shigang Old community was originally built as a dormitory for enterprise employees, so it did not take into account the needs of community residents for an appropriate aging environment decades later. From the level of material environment, barrier-free facilities do affect the direct activities of elderly residents, and the overall lack of appropriate aging environment also directly reduces residents' willingness to activity. Building an integrated and convenient aging environment is the key to improving the quality of life of the elderly and the inclusiveness of the community. Taking into account the physiological and psychological needs of the elderly, a series of meticulous design and transformation measures are adopted to ensure the safety and comfort of the community environment.

The principle of integrity requires that the aging of local or single elements should not be considered in the design or renovation of the community environment, but should be systematically planned and comprehensively considered to coordinate the construction of the whole environment. Convenience means that the activity preferences of elderly residents should be fully considered in the renewal design, and safe "shortcut routes" should be provided for community residents. For example, in order to improve the convenience of daily travel for the elderly, the design of pedestrian roads should be closely connected with the entrances and exits of

residential buildings, community gates, outdoor activity venues and public service facilities to ensure the direct and convenient path. Reduce unnecessary detours; When designing, the travel habits and needs of residents should be fully considered, the shortest and most convenient "shortcut route" should be identified and planned in advance, and the route should be integrated into the overall road system design.

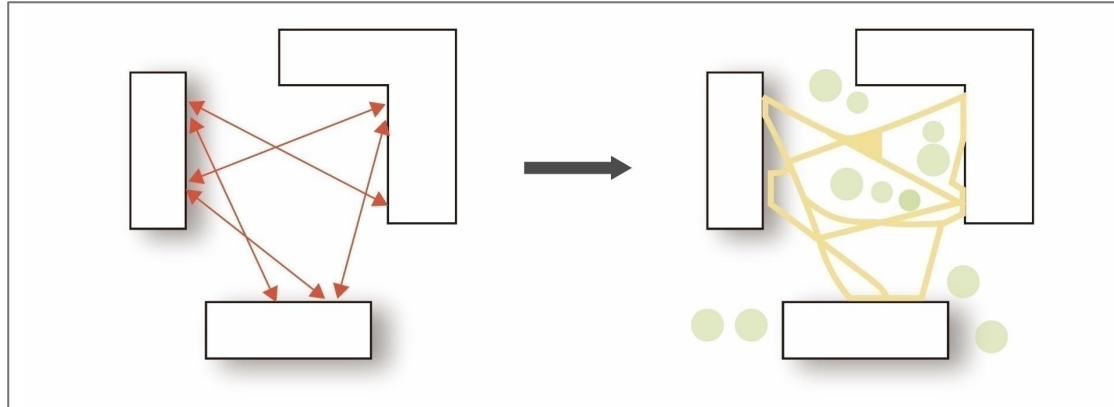


Figure 5- 20 Construction Of Holistic and Convenient Environment Suitable for the Elderly  
(Source: author's drawing)

## (2) Construction of Barrier-free Community

The aging and barrier-free community environment should not only focus on the level of physical environment, but also include road barrier-free, public building barrier-free, public transportation barrier-free, community service barrier-free, family barrier-free transformation, information exchange barrier-free and other aspects.

For example, by coordinating the material space, optimizing the space properties to realize the environment of the community, tapping the potential of the reuse of idle space, and mining, integration and reuse of the existing idle space. Through the way of "strengthening function + clarifying the meaning of space and place + micro-space design", the idle and occupied private area is transformed into a public space to realize space sharing; And through the creation of community culture, to achieve the communication of community integration, cultivate the spirit of place, strengthen neighborhood exchanges, and build a complex and inclusive communication space conducive to intergenerational interaction. Create a space with a sense of place to provide comfortable outdoor activities for the elderly.

### 5.3.3 Service Complete Strategy

The service integrity strategy emphasizes that community public space is used as the basis of media and services, and uses its characteristics of openness and sharing to build high-quality elderly care services and public management for all community residents. The strategy part of service integrity and participation integrity is also in line with the requirements for the construction of community software dimension in the concept of complete community. At the same time, considering that the old communities have long lacked the intervention of professional property companies providing services and management, as well as the urgent needs of community residents, it is necessary to focus on the service mechanism and content of the intervention of community public space, and on this basis, ensure the service quality and build a perfect service system.

On the level of overall software renewal, we can learn from the concept of embedded society, which is often mentioned in the social issue of community elderly care in recent years, that is, on the basis of community elderly care, different elderly people can still live in the community and enjoy related facilities and services in the original community, so as to maximize the use of relevant resources in the community.

#### 5.3.3.1 Service Mechanism

The embedded pension model takes the community as the main carrier, and the pension function and the pension facilities as the embedded elements. Through the deep integration of the two, it realizes the synergism and symbiosis, and builds a convenient, comprehensive and targeted pension system to meet the diversified needs of the elderly groups in the community<sup>[93]</sup>. From a practical point of view, such a model can fully rely on community resources and integrate and optimize the allocation of various service elements with the help of intelligent platforms to promote the sharing and utilization of resources. At the same time, according to the actual needs of the elderly in the community, elderly care services can be enriched and improved by embedding elderly care facilities or making adaptive adjustments to the existing functional space, so as to improve the overall coverage and pertinence of

community elderly care.

In terms of the operation of the relevant mechanism, first of all, the relationship between the public space of the community and the embedded elderly care facilities, functions, scenes and service providers should be well coordinated. The community space as the "embedded carrier" and the relevant "embedded body" should maintain a stable relationship, and the service scope of the relevant service facilities and the service content of the service providers should be determined. Ensuring that services are available to all communities; Secondly, according to the needs of residents and the actual situation of the community, it is also necessary to accurately grasp the functional positioning of the "embedded body", allocate according to demand, make up for the lack of service capacity of the community public space, replace and embed the part with low utilization rate, and make targeted supplement to the missing part, so as to achieve "reasonable embedding". In addition, the "embedded resources" in the inner space of the community should strengthen their links, make them fully related and shared, and promote related resources to serve and cover the community space more comprehensively and extensively.

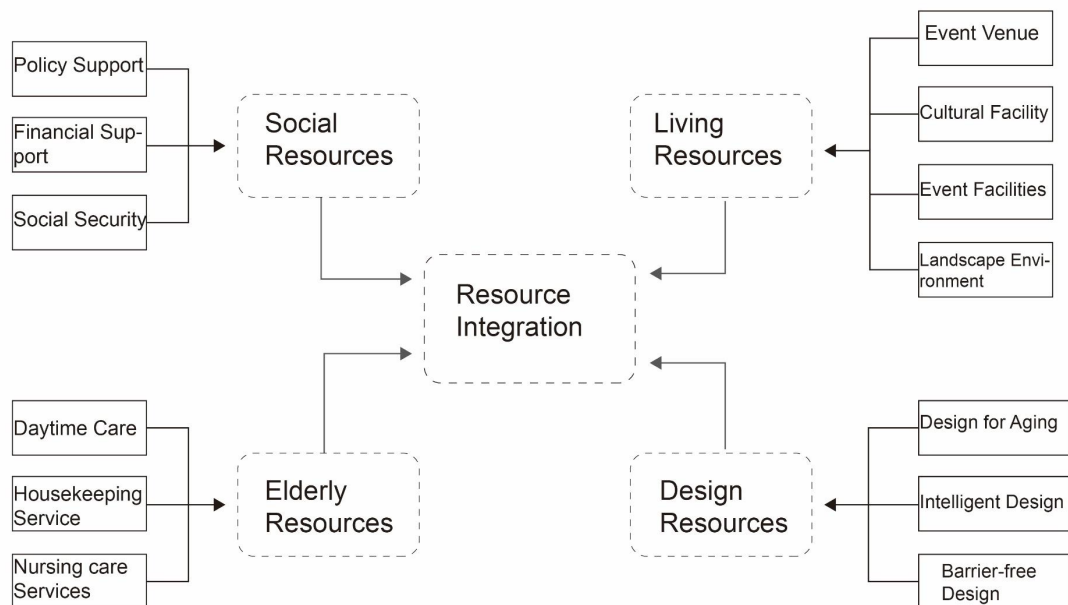


Figure 5- 21 Schematic Diagram of Resource Integration Service Mechanism

(Source: author's drawing)

In the implementation of updating activities, the advantage of resource



integration of embedded pension mode should be fully utilized to fully and effectively integrate the community's public space with various pension facility resources. By exploiting the potential of the community's hardware and software dimensions, the community's social resources, living resources, pension resources, design resources and other related resources should be connected and integrated. Mutual sharing and borrowing, as a supplement to community elderly care services.

### 5.3.3.2 Service Content

#### (1) Intelligent Management and Intelligent Pension

For the creation of service content, it can focus on the shaping of intelligent elderly care and intelligent communities, and make up for the lack of service and operation capabilities of old communities with the construction of information and modern systems. In the "12th Five-Year Plan" for the Development of China's aging cause, The State Council clearly proposed to "promote the information construction of elderly care institutions." Compared with the traditional pension model, intelligent pension has greatly improved in the aspects of security and communication with the outside world. Under the background of the deepening of scientific and technological revolution and the increasingly mature, the socialization and wisdom of pension services is also an important means to solve the lack of community pension resources and the low standard of related services under the background of the rapid development of aging population in our country.

At the application level, intelligent elderly care should be combined as a key part of intelligent management. For example, in addition to recording residents' activity scenes and stopping uncivilized behaviors, the monitoring of community public space can also be used to detect the health of the elderly participating in activities and capture their health status. At the same time, relevant technologies are used to detect safety hazards that may adversely affect the activities of the elderly.

At the same time, the intelligent elderly care in the Internet era can also supplement relevant community services by means of the development framework of the online platform, and build a intelligent service platform, which can include



sub-platforms such as menu-type home elderly care service, case-by-case integrated service management, Internet of Things and Internet service integration and community aging affairs work, and multi-tenant technology design based on the cloud platform. IT is easy to scale across different communities, enabling individual communities to reduce the resources and professionals needed to build, manage, operate, and maintain their IT platforms for rapid deployment and service delivery.

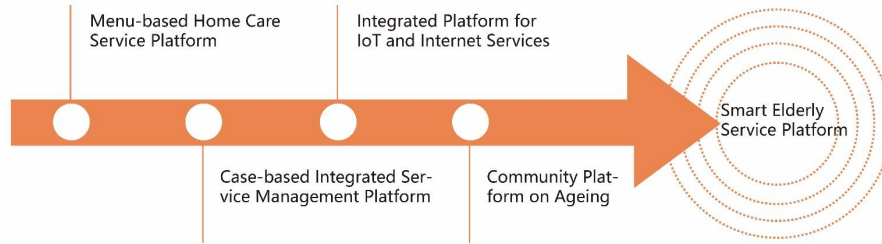


Figure 5- 22 Smart Service Platform Architecture Diagram

(Source: author's drawing)

## (2) No Property Management Mode: Digital Comprehensive Management Plan

In view of the lack of property service management intervention in old communities, the use of digital comprehensive management platform and the coordination of relevant social resources can make up for the lack of community service capacity to a certain extent.

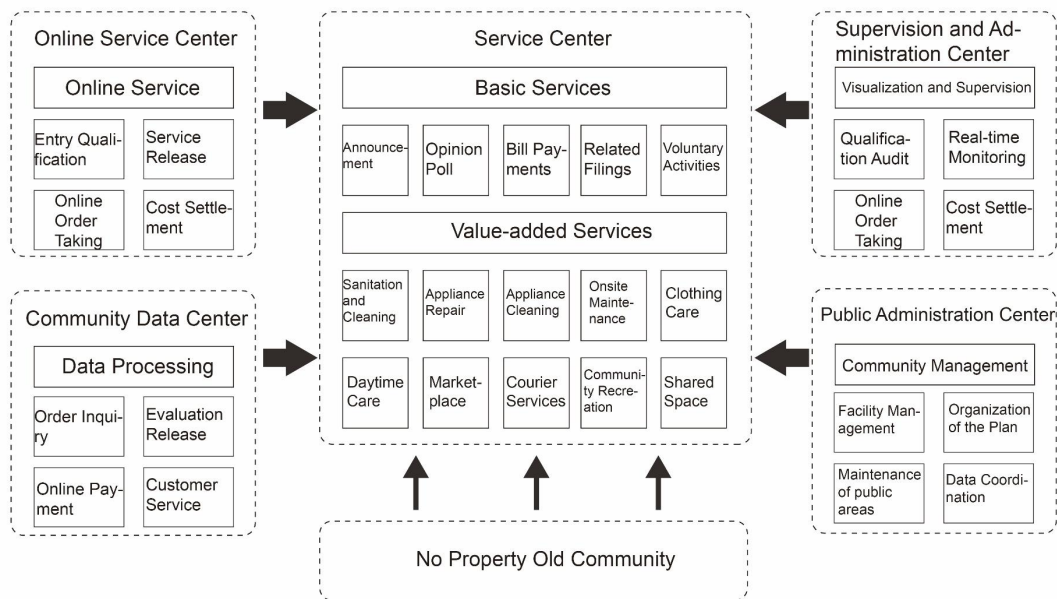


Figure 5- 23 Schematic Diagram of the Digital Integrated Governance Platform Architecture

(Source: author's drawing)

Through the "digital virtual property platform" business integration, service agencies, service personnel, property companies, e-commerce platforms, community residents, volunteers, and communities are brought together into a virtual platform, and multiple subjects are encouraged to participate in community management and services on a unified platform; The virtual property platform introduces the property company through the open thinking, so that it can provide professional services for the community outside its jurisdiction, so as to solve the problem of fixed service boundary.

At the level of process architecture, through the service center providing various services, the online service center processing services, the community data center responsible for relevant data processing, the supervision center responsible for relevant supervision and management, and the public management center operating community management are integrated to follow up the relevant demand orders of old communities without property and community residents. Community residents can obtain related services through the virtual platform. One type is basic services, including opinion consultation, one-click complaint and bill payment, etc., to meet the basic service demands of non-property communities. The other category is value-added services, which can also be called ecological services, integrating high-quality social service resources. These value-added services provide residential residents with household maintenance, community health care, community e-commerce and other content to achieve service matching, so that residents enjoy convenient, affordable and high-quality services.

#### 5.3.3.3 Service Quality

In addition to the complete service mechanism and sufficient service content, the service quality of the old community needs to be guaranteed. Service quality is not only reflected in the completeness and functionality of service facilities, but also in the timeliness, professionalism and humanization of services. Improving service quality is a key link to ensure that community public space can meet the diversified needs of residents and enhance their satisfaction and sense of belonging.

### 5.3.4 Participating Complete Strategy

The Participatory Complete strategy encourages community residents to actively participate in the planning, management and maintenance of community public Spaces. Through the establishment of residents' meetings, volunteer organizations and other forms, to promote residents to play the main role in the process of community renewal; By enhancing the participation of residents, the transparency and effectiveness of community governance will be enhanced, and residents' sense of belonging and responsibility for the community will be enhanced. The complete strategy of participation can be divided into three sub-indexes: space, crowd and mechanism. Among them, community public space, as a participation space, not only has the characteristics of non-exclusivity at the architectural conceptual level and the characteristics of culture and symbol in the sociological sense, but also can be viewed from the perspective of social theory proposed by Lefebvre. From the dimensions of "perception" and "life", it is reconstructed as the actual carrier of participation in the theme of integrity<sup>[94]</sup>. The participating groups mainly focus on the elderly residents of the community, and the overall participation strategy is formed by the corresponding participation mechanism of multiple co-governance and multi-participation.

#### 5.3.4.1 Participation Space

As mentioned above, community public space has multiple attributes in urban life and production, the cross-border physical space, the circulation of social space and the transmission of spiritual space will produce social adaptation effects, which are also reflected in individual psychology, behavior and cultural thoughts. On the one hand, the change of physical space form will affect the way individuals choose to participate in society; on the other hand, the imbalance and inequality between urban space and resident communities may lead to the problem of integrated development and the confusion of social participation caused by the identification of space. Therefore, to participate in the renewal and reconstruction of space, in a deep sense, it also lies in alleviating the inequality in the development and operation of urban

communities and public Spaces, and establishing the collective identity of community residents. The renovation and construction of existing community public space are mainly maintained and renewed from the perspective of physical space entities, or the mining of human elements and the optimization of administrative operation mechanism, etc. However, specific renewal activities tend to focus on a single direction of action, and lack the consideration of composite dimensions from an overall perspective.

For the construction of participation space, the material place can be comprehensively optimized and transformed by corresponding technical means, focusing on the diversified needs of community residents, providing comfortable, convenient and functional places, and encouraging residents to interact, participate in decision-making and carry out activities here; Explore the potential of community stock, transform it into a variety of shared Spaces, and stimulate the public vitality of the community.

#### 5.3.4.2 Participants

Participation in integrity means that the renewal of community public space requires multi-party participation and multiple co-governance systems, among which, community residents, as the direct users of community space and the biggest beneficiaries of renewal activities, should undoubtedly play their main role in the renewal activities. The construction methods of community micro-renewal and residents' spontaneous renewal advocated in recent years also confirm this theory. How to fully stimulate the enthusiasm of community residents in the renewal activities and integrate the needs and suggestions of residents is the focus of this strategy.

At the same time, the incentive level for community residents, as a participating group, focuses on the reconstruction of identity at the emotional level, that is, the renewal of community public space takes cultural communication, spatial cultural narrative and emotional identity as the carrier, and uses flexible emotional governance to promote the endogenous development of cultural emotions in community space.

Through the emotional design for the users of public space, the development and renewal of space return to the emotional daily spirit, just as the bottom-up renewal form intervenes in the community space group identity, which is not only the internal requirement of the renewal of public space, but also the essential connotation of the social category in the community renewal.

At the specific level of strategy implementation, it can be carried out from the basic needs of community residents and key areas of concern, such as the optimization and solution of basic problems in the community such as motor vehicle parking, electric vehicle charging, garbage disposal, etc., to the improvement of leisure places, green landscapes, sports venues and other high-quality old-age living community venues. And then to carry the community memory and cultural spirit of the overall construction of the spatial dimension, so as to radiate the participation of residents at different levels.

#### 5.3.4.3 Participation Mechanism

The participation mechanism affects the role played by the two factors of participation space and population, and balancing the interaction between public institutions, markets, residents and other participating groups also directly affects the creation of community space renewal. In the implementation process of this community renewal plan, the author also discussed the relevant participation mechanism on the current situation of the community, that is, the responsible planner system of "1+1+1+N" was used for the overall planning of multiple co-governance.

The relevant system takes the "Qinghe Action" carried out in Haidian District of Beijing under the background of the responsible planner system as a case study to study the practice mode of responsible planners to promote urban renewal based on public demands. Specifically, the first three "1" respectively refers to the first public institution, that is, government agencies, community neighborhood committees and other public institutions, responsible for the overall planning of the community renewal project related project approval and various start-up work; The second responsible expert, that is, the person in charge of the relevant project appointed or

hired by the public authority, can be the relevant work of the design unit or the relevant research group of the university, responsible for the overall renewal plan design and implementation supervision through the field investigation and integration of residents' needs; The third relevant market refers to the relevant companies in the market, such as property service companies, elderly care companies, etc., which access the relevant daily activities of the community in their respective fields of operation and are responsible for the continuous operation and collaborative governance of the community. Finally, "N" refers to the large number of residents of the community, who play a decisive role as the center of community renewal and fully participate in the relevant affairs at all stages of renewal and operation.

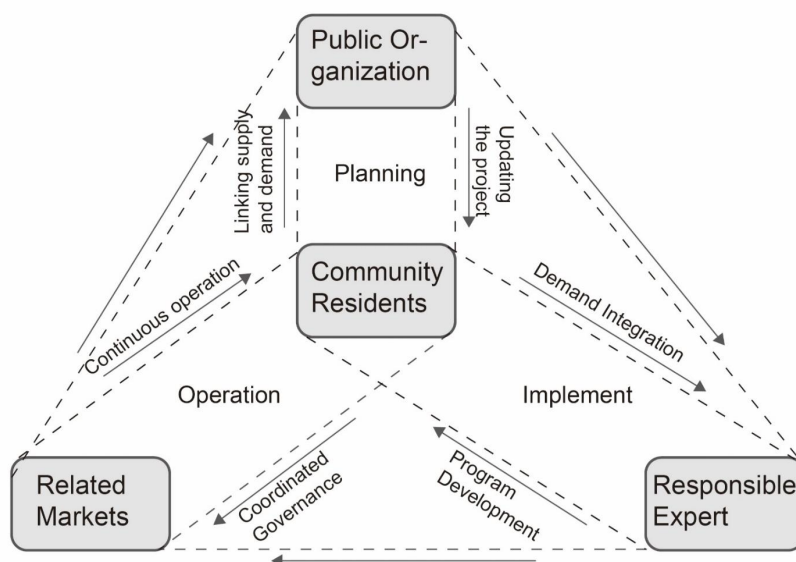


Figure 5- 24 Schematic Diagram of the Participation Mechanism under the Full Participation Strategy

(Source: author's drawing)

The model takes problems within the community as the starting point and solves them through linkage mechanisms at the regional level. In the process, the responsible planner plays a key role. First, the responsible planner acts as a bridge to "link supply and demand" and promotes the communication and cooperation between the government, experts, market and other multi-parties. Secondly, in the stage of "promoting the project", the responsible planner provides strong support for the smooth start of the project by virtue of its professional knowledge and resource

integration ability. Thirdly, in the "plan making" link, the responsible planner works out a scientific, reasonable and feasible renewal plan by integrating the knowledge of all parties; Finally, in the "collaborative governance, continuous operation and maintenance" stage, the responsible planner coordinates the forces of all parties to ensure the long-term stable operation of the project. Through this model, responsible planners take the needs of citizens as the core, effectively promote multi-party coordination, and provide a strong guarantee for urban renewal.

Specifically, the responsible planner plays multiple key roles in the renewal process. First of all, in the problem identification stage, planners accurately find urban problems through in-depth observation of the grassroots and extensive public opinion surveys, acting as "whistle-blowers"; Secondly, at the project initiation stage, I initiate initiatives with the identity of the design leader, acting as the "spokesperson" of the people, effectively linking the needs of the citizens and government resources, and promoting the project initiation; Thirdly, in the planning stage, the responsible planner not only gives full play to his professional expertise, but also extensively absorbs opinions from all parties. As an "integrator", he integrates the wisdom of experts and local experience to elaborate the renewal plan. Finally, in the implementation stage, we rely on the responsible planner system to build a collaborative governance platform and, as a "coordinator", coordinate various forces to ensure the orderly implementation and continuous operation and maintenance of the plan.

### 5.3.5 Humanistic Complete Strategy

Humanistic integrity strategy focuses on the cultural and spiritual aspects of community public space and the humanistic care for community residents. Through the three levels of scene implantation, cultural shaping and humanistic care, the aim is to enhance residents' sense of identity and belonging to the community culture, including protecting and inheriting the historical and cultural heritage of the community, and showing the characteristics of the community through art installations and cultural activities. At the same time, through education and publicity activities, residents' sense of identity and belonging to the community culture are

enhanced. Through community stories, landmark elements, etc., strengthen residents' sense of community identity and build community spirit.

### 5.3.5.1 Scene Implantation

#### (1) Scene construction framework of community public space

The core of scene theory lies in understanding and analyzing social interaction and cultural expression in a specific environment, that is, it believes that scene is not only a physical space, but also includes related social activities, cultural atmosphere and social structure, emphasizing the multi-dimensional nature of scene, including multiple levels such as material environment, social interaction and cultural significance. Combined with the previous relevant research on scene theory, The research framework is simplified, so as to carry out the implantation of scene construction for specific community.

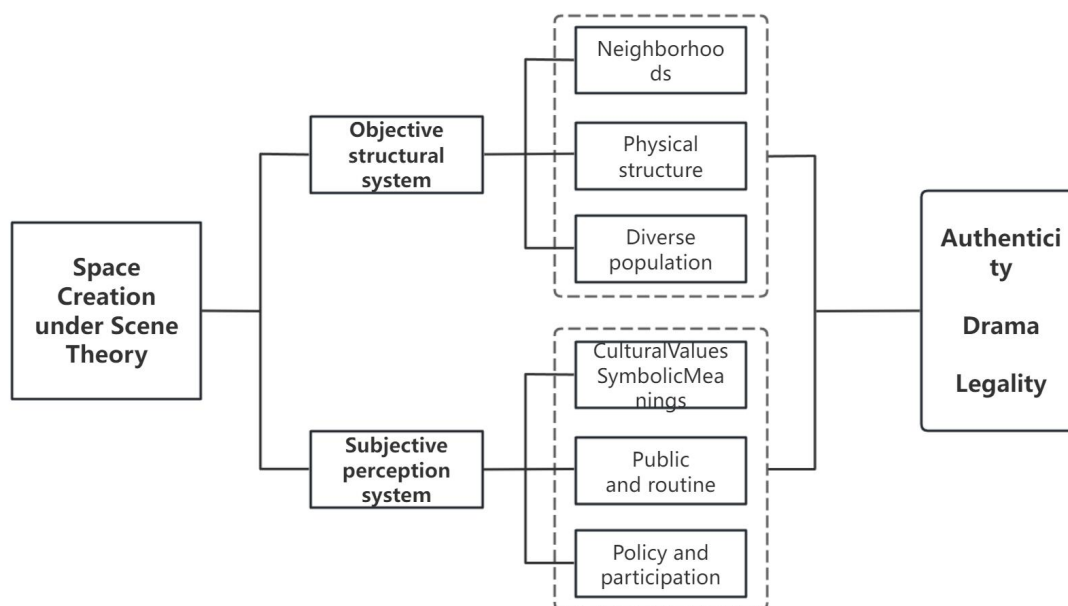


Figure 5- 25 Schematic Diagram of Space Creation Framework under Scene Theory

(Source: The author summarizes and draws the picture based on relevant information)

Scene is not only a collection of physical space, but also a carrier of social and cultural activities, as well as a collection of community material objective structure system and population subjective cognition system. In the objective dimension, the structure of the material public space of the community, the user group represented by the residents and the neighborhood relationship between them constitute the structural system, while the community culture and symbols, publicity and routine, as well as



policies and participation jointly create the cognitive system, and the two systems superimpose effects to achieve the authenticity, drama and legitimacy of the space.

Among them, the neighborhood emphasizes the closeness of social interaction, the material structure pays attention to the functional adaptability of the spatial layout, and the introduction of diverse people guarantees the inclusiveness and vitality of the space. At the same time, the subjective cognitive system gives deeper meaning to the space from the perspective of cultural value, publicity and policy participation, making it go beyond a simple physical place and become a composite scene bearing local culture, daily life and public participation. Cultural value and symbolic meaning strengthen the historical inheritance and identity of the place, the public and daily nature enhance the accessibility and frequency of use of the space, and the guidance of policy and participation ensure the fairness of scene implantation and the sustainability of governance. The two complement each other. The objective structural system provides basic support, while the subjective cognitive system entrusts the space with deep cultural and social values, jointly shaping a real, dramatic and legal public space, and ultimately realizing the goal of creating a complete scene of humanity.

## (2) Integration of Community Scene Construction Elements

In the process of updating community public space, scene construction is essentially a process of integrating community scene elements, condensing cultural value connotation and shaping community consumption scene.

Community scene is composed of objective structural elements and subjective cognitive elements, community space is the carrier of community activities and residents' life, and comfort facilities are the key conditions to guide and support behavior. As the subject of behavior, community residents interact with amenity facilities in community space to form community life. Community life is the external expression of the community scene, and cultural values are its spiritual connotation. Community life and cultural values interact, and cultural values not only affect the behavior of residents, but also can shape community life. In the process of community renewal, by integrating community space and implanting comfortable facilities, the

material environment is adjusted to attract diverse people to participate in public life, enhance residents' sense of identity and belonging, and finally form a community scene unit with vitality and consumption value[95].

### (3) Continuation of Value Connotation

Based on the scene experience theory, the scene implantation in public space should take the behavior pattern of users as the core, create attractive and participatory space scenes, and promote the deep interaction between people and space. At the same time, we should follow the principle of cultural narration, combine local culture, historical memory with modern life style, and form space image with place spirit.

The value of creating scenes is not only reflected in the renewal of the material environment of the community, but also through mining cultural values, guiding consumption practices, promoting the active participation of community residents, thus reflecting the endogenous power of cultivating community renewal. Therefore, scene implantation not only has social and cultural value, but also contains profound economic value. By shaping public space with cultural characteristics and situational experience, regional attraction can be enhanced, commercial activities can be promoted, and community economy can be promoted. The embodiment of cultural value not only enhances the cultural identity of the community, but also empowers the community economy, forming a unique community economic scale. Through cultural consumption, characteristic activities and scenario-style business models, scene implantation can effectively guide residents' consumption needs and extend users' stay in public Spaces and streets; In addition, the versatility and flexibility of the scene can also attract diversified social investment, forming a sustainable economic growth point and operation model.

#### 5.3.5.2 Culture Shaping

##### (1) Building Cultural Places in Community Public Space

The core goal of cultural shaping of the old community is to perceive the context of its self-defined existence in the community through the community residents'

experience of the environment, so as to generate a sense of identity and belonging to the community. This kind of perception and experience can be mainly divided into two levels: physiological sense and psychological emotion. At the physical sense level, community users connect and experience through multiple senses, such as hearing, smell and touch, and resonate with the community material space. Then, the relevant sensory experience can enhance the identity of Hua Wei at the psychological level, and this identity can be further realized through the construction of community place sense and community humanistic network.

When the material space carries spiritual and cultural connotation, it can be transformed from a simple space into a place, and "place memory" is the key to this transformation. It endows the space with cognitive, emotional and cultural significance, makes the material structure and social and cultural evolution of the community conform to its internal development law, presents a unique community style and image, and becomes an important symbol of urban characteristics. At the same time, it is also the basic vein of the existence of community space resources themselves[96]. As proposed by Kevin Lynch, the urban intention is composed of five elements: region, boundary, node, node and symbol. As an organic part of the city, the old community's sense of place shapes its features closer to life and regionalization, which can highlight the difference of regional culture and the place memory of the community, thus enabling the existence of self-cognition of the community residents. And further enhance their identity and belonging to the community. In addition, the construction of community humanistic network is also an important aspect of culture shaping. By excavating and displaying the humanistic characteristics of Chinese neighborhood communication, cultural customs, living habits and value concepts, we can create harmonious neighborhood relations and humanistic spirit. Residents experience the harmonious blend of material space and cultural identity in a good environment, thus further strengthening the emotional connection and sense of belonging to the community.

## (2) Induction and Development of Humanistic Elements of Community Public Space

The mining of humanistic elements is an indispensable link in the renewal of

community public space. Through in-depth research and analysis of community history, culture, social structure and residents' needs, the representative and valuable humanistic elements can be extracted, which can provide rich materials and profound cultural deposits for the construction of community scenes.

The development of human elements of community public space should further explore its spatial practice and social value on the basis of the existing classification of life type, memory type and inheritance type, so as to realize the sustainable development and innovative inheritance of community culture. The development of human elements should strengthen the daily life of the community, including processing, optimizing social network and interaction space. For example, by creating shared Spaces in the neighborhood, adding leisure activities and organizing regular social activities, residents can enrich their daily activities and promote community cohesion; In addition, combined with intelligent community technology elements, such as intelligent social platforms, community autonomous management systems, etc., to further enhance the consumption and sustainability of daily humanistic elements.

Table 5- 2 Summary of Humanistic Elements of Community Public Space

Type	Form and Content	Development Method
Daily Type	Residents' daily living habits, activities, social networks, etc.	Emotional protection and continuation of the life scene and humanistic habits formed by residents over a long period, enriching the daily humanistic spirit of the community.
Memory Type	Collective identity of community residents, collective emotions, and shared memories of units, historical events of the community, etc.	Reconstructing collective memories through methods such as "scene reproduction," integrating them into the community's humanistic spirit construction activities, and promoting public spaces to become carriers of related scenes.
Inheritance Type	Local customs, traditions, food culture, etc.	Using relevant cultural elements as cultural media for the community, promoting related publicity and activity operations to facilitate their activation and inheritance.

(Source: compiled by the author based on relevant information)

In the aspect of the development of reminiscential humanity, more attention should be paid to the protection and representation of community historical memory. In addition to the reconstruction and integration of community common memories by means of "scene reproduction", modern technologies can also be used to create

immersive historical and cultural experiences at specific times and festivals, so as to arouse cultural resonance of residents and enhance their sense of identity of community culture. In addition, the combination of public art and spatial narrative, such as through sculptures, images or interactive installations and other forms, will embed the historical story of the community into the public space, becoming a place with educational significance and cultural value. The development path of inheritance-type craft humanistic elements should take the activation and utilization of community cultural resources as the core, and promote the modern expression of folk customs, traditional skills and food culture. For example, a community cultural experience center is established to regularly hold traditional hand courses, folk festival activities and non-exhibitions, so that residents can feel the unique fun of culture in the process of participation. In addition, cultural and creative industries can also be introduced in combination with market mechanisms, and elderly residents in communities can be encouraged to participate in the creation and promotion of cultural products, so that cultural inheritance and economic development can be combined to form a benign cultural ecosystem.

In general, the development of humanistic elements of community public space should be carried out from multiple dimensions such as residents' daily life, collective memory and cultural inheritance, and a more three-dimensional, diversified and sustainable community cultural system should be built by combining various means such as space atmosphere, technological innovation, industrial development and social participation. Through the implementation of scientific and reasonable strategies, public space can not only become an important carrier of community culture, but also promote the improvement of the overall vitality of the community while meeting the spiritual needs of residents.

### 5.3.5.3 Humanistic Care

#### (1) Community Care Level

In addition to the shaping of life scenes and humanistic elements, the humanistic care carried and reflected in community space is also an indispensable part of the

integrated strategy of community space humanism. The application of humanistic care concept in the renewal of public space in old communities mainly reflects the improvement of material space environment for the aged and the satisfaction of emotional experience needs of the elderly.

First of all, humanistic care at the spatial level can be reflected in the creation of all-age inclusiveness, enhance the activity of community space, and promote the application of multi-generation sharing space mode. At the same time, intelligent elderly care services in public space can be realized based on interconnection Internet of Things technology, crossing the boundaries of traditional physical space. It enables children to realize safe nursing and spiritual care for the elderly remotely.

#### (2) The Promotion of Neighborhood Social Interaction

Community humanistic care is also reflected in the promotion of neighborhood relations and social behaviors of elderly residents in public space, to meet the elderly's needs for communication, entertainment, leisure, health and other multiple functions. In the process of renewal, diverse social needs and patterns of elderly community residents are taken into account, and a "sociability without boundaries" is created at the overall level of community public space.

#### (3) Cultural Space Connection

The humanistic care of community public space also lies in its connection to community places and residents' emotions. Public space should not only provide a place for activities, but also a place that can provide emotional connection. Attention should be paid to the emotional needs of the elderly, as well as the representation and design of place space in the community. At the same time, the design should retain the original natural elements of the site, such as terrain, trees and ancient Wells, and create familiar scenes for them, so as to strengthen the continuous feeling of life for the elderly, increase the connection between the elderly and nature and land, and create new place memories for the elderly.

### 5.3.6 Developing Complete Strategy

The construction of a complete community spirit dimension is not only limited to

the construction of humanistic care and spirit, but also should consider the future development possibility of the community and its public space itself as an organic part of the city. It focuses on the long-term development of community public space and the ability to adapt to future changes, considering the long-term community development planning, while maintaining the flexibility of space and function to adapt to possible future changes, emphasizing that while meeting the current needs, the development flexibility should be reserved for the future changes in community population structure, technological upgrading and social demand evolution. So as to realize the organic growth and sustainable vitality of community public space.

The strategy aims to ensure long-term adaptability and sustainability of community public space in function, form and management through comprehensive means of flexible adaptation, dynamic renewal and reasonable reservation, and build a three-dimensional framework for sustainable development of public space in Dual-aged communities. Elastic adaptation entrusts the dynamic adjustment ability of spatial form and functional configuration, dynamically renews the management mechanism to ensure the continuous matching of residents' needs, and reasonable reservation provides strategic buffer for future technological iteration and social change. The three jointly promote the transformation of community public space from static material carrier to organic life, and provide an innovative path for community resilience improvement and intergenerational integration under the background of aging.

### 5.3.6.1 Elastic Adaptation

#### (1) Modular Design

In order to adapt to the current situation of limited capacity of public space in old communities, modular combinations can be carried out according to different ideas in the updating of different periods. At the practical level, the composite mode of "basic module + functional plug-in" can be adopted to place different modules in public space, and adjust the area, content and combination form of modules according to specific requirements, so as to complement each other at the functional level to

achieve spatial coordination in actual use. At the same time, the modular design is also conducive to the re-planning and utilization of community space, reserving development space and providing basic support for the future dynamic development of the community.

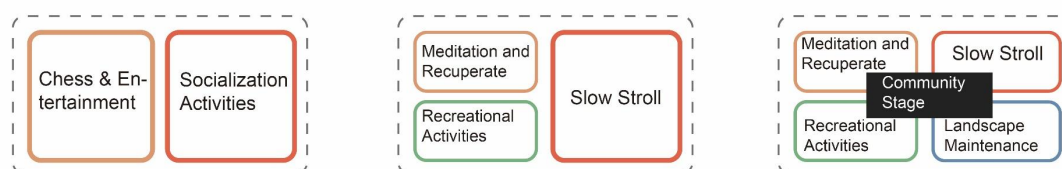


Figure 5- 26 Modular Design Diagram

(Source: author's drawing)

In addition, the modular design can be combined with functional implantation and barrier-free design and other related renewal ideas to form a combination of age-appropriate functional plug-ins that can be "plug and play". For example, the Sanyanjing community in Guangzhou mentioned in the previous case analysis, through the renovation of the modular flower box with a roller, it not only meets the daily greening needs, but also can be reorganized as a temporary stage boundary during festival activities, reflecting the flexible design thinking of "one thing with multiple uses". In particular, a variety of plug-ins can be formed through the installation of movable seats, combined sunshades, modular planter boxes and other facilities to improve space utilization.

## (2) The Creation Of Functional Complex Space

In view of residents' spontaneous daily activities and needs, the allocation of composite functions is used in space renewal to compensate for the single problem of community public space function, and at the same time, the general functions suitable for all kinds of elderly people are actively strengthened to build a flexible and variable public space system to cope with the uncertainty of community development. At the spatial layout level, an "elastic grid" model can be adopted to realize dynamic switching of functions in combination with modular related design. For example, the core square of the community can be used as a leisure place on weekdays through modular paving and temporary partition, and can be quickly transformed into a market or exhibition space during festival activities.



### (3) The Creation of Functional Complex Space

According to the changes in the timing of residents' needs, the design and operation of public space can be time-shared, so that public space can carry more diversified daily activities and make the most efficient use of community public space.

#### 5.3.6.2 Dynamic Renewal

To treat the issue of community renewal with a developing and continuous attitude and establish a dynamic renewal mechanism, the strategy of dynamic renewal also conforms to the organic renewal concept of "leaving blank and improving dynamically" proposed by Mr. Wu Liangyong and his community renewal idea of realizing the spiraling improvement of community space quality through gradual and small-scale continuous intervention.

The strategy emphasizes the establishment of a continuous improvement mechanism of "evaluation - feedback - optimization" to promote the transformation of community public space renewal from a one-time project to a normal governance. At the same time, it is necessary to improve the residents' participation mechanism, set up community councils and online feedback channels, and encourage residents to put forward suggestions for phased improvement of space renewal. At the specific implementation level, it can rely on the intelligent community platform to build a space use database, collect information such as crowd density, facility use frequency and environmental quality data through sensors in real time, and form a multidimensional evaluation system combined with residents' satisfaction survey to form a continuous and dynamic renewal mechanism.

#### 5.3.6.3 Reasonable Reservation

The rational reservation strategy focuses on the elastic expansion of spatial resources and functional capacity, such as the "urban acupuncture" strategy proposed in the Dutch urban renewal activity, that is, through small-scale space reservation, to achieve the development balance of community renewal. For example, at the level of renewal mechanism, through the "negative list" management model, the area of

conservation renewal and development of community public space is defined, such as ancient trees and other elements inside the community, so as to reserve development space for ecological protection and cultural inheritance; At the design level, the use of inefficient Spaces such as community "gray space", corner space, and abandoned facilities for temporary functional implantation, rather than overnight fixed development, can not only improve the quality of the current status of the space, but also retain the carrier for future functional upgrades.

## 5.4 Renewal Method and Process

At the level of method process, the updating method synthesizes the above updating principles, objectives and strategies to form an integrated methodology, and proposes a four-stage systematic updating method process of "diagnosis - design - implementation - operation and maintenance", organic integration of multi-dimensional strategies and dynamic feedback mechanism to realize the scenario-based regeneration of public space in old communities.

With the "hardware - software - spirit" three-dimensional collaborative framework as the core, the six strategies of functional integrity, environmental integrity, service integrity, participation integrity, humanistic integrity, and development integrity are transformed into operational design paths. Among them, the integration of functional integrity and spatial optimization ensures the practicality and accessibility of public space; The integration of environment enhancement and landscape construction ensures the aesthetics and culture of public space; The integration of service optimization and management improvement ensures the management efficiency of public space and the participation of residents; The integration of cultural heritage and neighborhood interaction ensures the cohesion of the community and the sense of belonging of residents; The integration of dynamic renewal and future development ensures the continued vitality of the public space and the sustainability of the community. The spatial repair of hardware dimension and the intelligent service embedding of software dimension are promoted simultaneously, and the cultural scene construction of spiritual dimension is designed to create a sense

of community identity through humanistic implantation and scene stimulation, forming a trinity of "spatial base - functional service - cultural core" renewal logic.

It should be further explained that the corresponding strategy and renewal mechanism of the three dimensions are not simply juxtaposed, but form an organic and unified overall renewal mechanism through dialectical integration, advocating the process through strategy nesting, scene transformation and dynamic adaptation, breaking the limitation of "single point breakthrough" in traditional renewal. The improvement of the material environment, the enhancement of service efficiency, the enhancement of cultural identity and the innovation of social governance support each other.

## 5.5 Summary of this Chapter

Based on the above theoretical research and case analysis, this chapter, aiming at the actual situation of Shigang community, clarifies the renewal principles and objectives, and puts forward specific strategies and methods for the scene-oriented renewal of public space in Dual-aged community under the concept of complete community. Through the unity and integration of multi-dimensional strategies such as functional integrity, environmental integrity, service integrity, participation integrity, humanistic integrity and development integrity, an organic whole is formed, which provides systematic guidance for the renewal of public space in Shigang community.

Relevant renewal strategies and methods are not only applicable to Shigang community, but also provide useful reference for the renewal of other similar communities. Through the guidance of the concept of complete community, the renewal of public space in Dual-aged community can realize the comprehensive upgrade of function, environment, service, participation, culture and development, and create a more livable, convenient and culturally rich living environment for residents.

## Chapter 6 Design Application - Shigang Community Public Space Renewal Design

This chapter is the design application part of this research. Through the combination of theoretical research and practical application, it aims to transform the renewal strategies proposed in the previous section into concrete community space renewal programs, and to provide an operable practical path for the comprehensive upgrading of public space in Dual-aged communities. In this chapter, through the logical framework of “design objective - overall planning - space construction - node design”, the design interpretation is carried out from the macro level to the meso level and then to the micro level, in order to achieve This chapter will develop the design from the macro level to the meso level and then to the micro level, in order to realize the goal of community regeneration through the three-dimensional synergy of “hardware-software-spirit”.

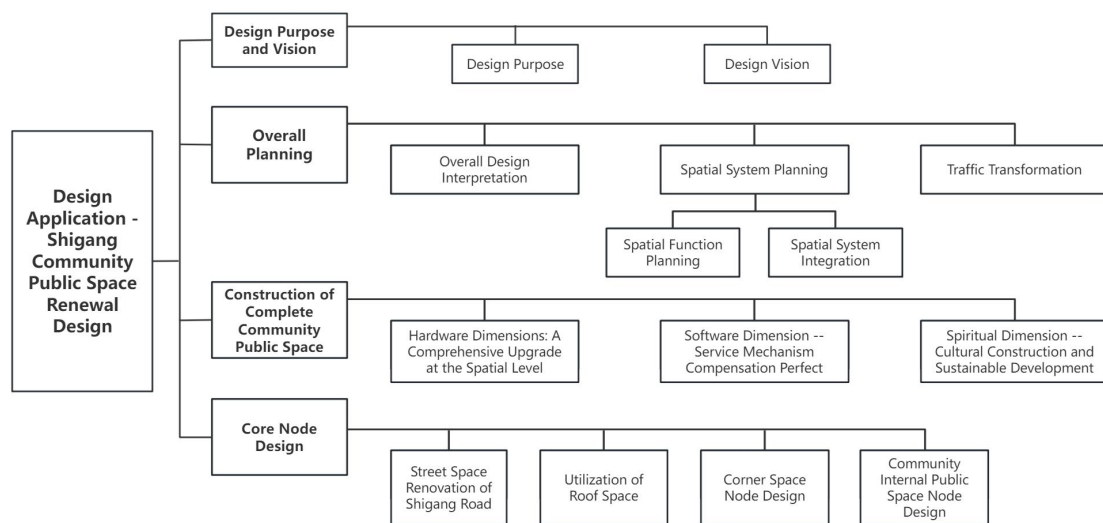


Figure 6- 1 Chapter VI Chapter Structure Framework Chart

(Source: author's drawing)

The research focus of the chapter is to demonstrate the operability and design effect of the proposed strategies and methods by combining theoretical research with practical research projects through design applications. The design covers the optimization of spatial layout, enhancement of Environmental Quality, improvement of service mechanisms, shaping of Humanistic Spirit and guarantee of development

resilience, in order to create a more livable, Intelligence and inclusive community environment for residents.

## 6.1 Design Purpose and Vision

Based on the above complete community theory research, generation strategy and evaluation results, this chapter takes Guangzhou Shigang Block as an example to carry out the scene renewal design at the level of community public space, and realizes the goal of "hardware-software-spirit" three-dimensional collaborative community regeneration through systematic and multidimensional spatial optimization and mechanism innovation.

At the design level, the weak link in the comprehensive evaluation, such as the spatial layout and environmental quality, is taken as the starting point, and the design renewal is carried out with some emphasis on the research area. Through the interpretation of the overall plan, the macro conditions such as spatial system planning and traffic integration of the renewal design are first clarified; the integration is realized through the design intervention of three dimensions in the middle level; finally, the corresponding typical nodes are selected for the design at the micro level to improve the integrity of the scheme.

In the specific design, it can improve the space efficiency by making up for the short board of function; Strengthen care for the aged and build a friendly environment; Activate the humanistic core and reshape the community identity; In terms of innovating governance model and ensuring long-term operation, it corresponds to the six basic renewal strategies mentioned above.

In terms of the overall goal, through the trinity strategy of "space darning - service embedding - cultural activation", the complex needs of the aging community are systematically responded to, and the qualitative upgrading from "old residential area" to "complete community" is finally achieved.

## 6.2 Overall Planning

### 6.2.1 Overall Design Interpretation

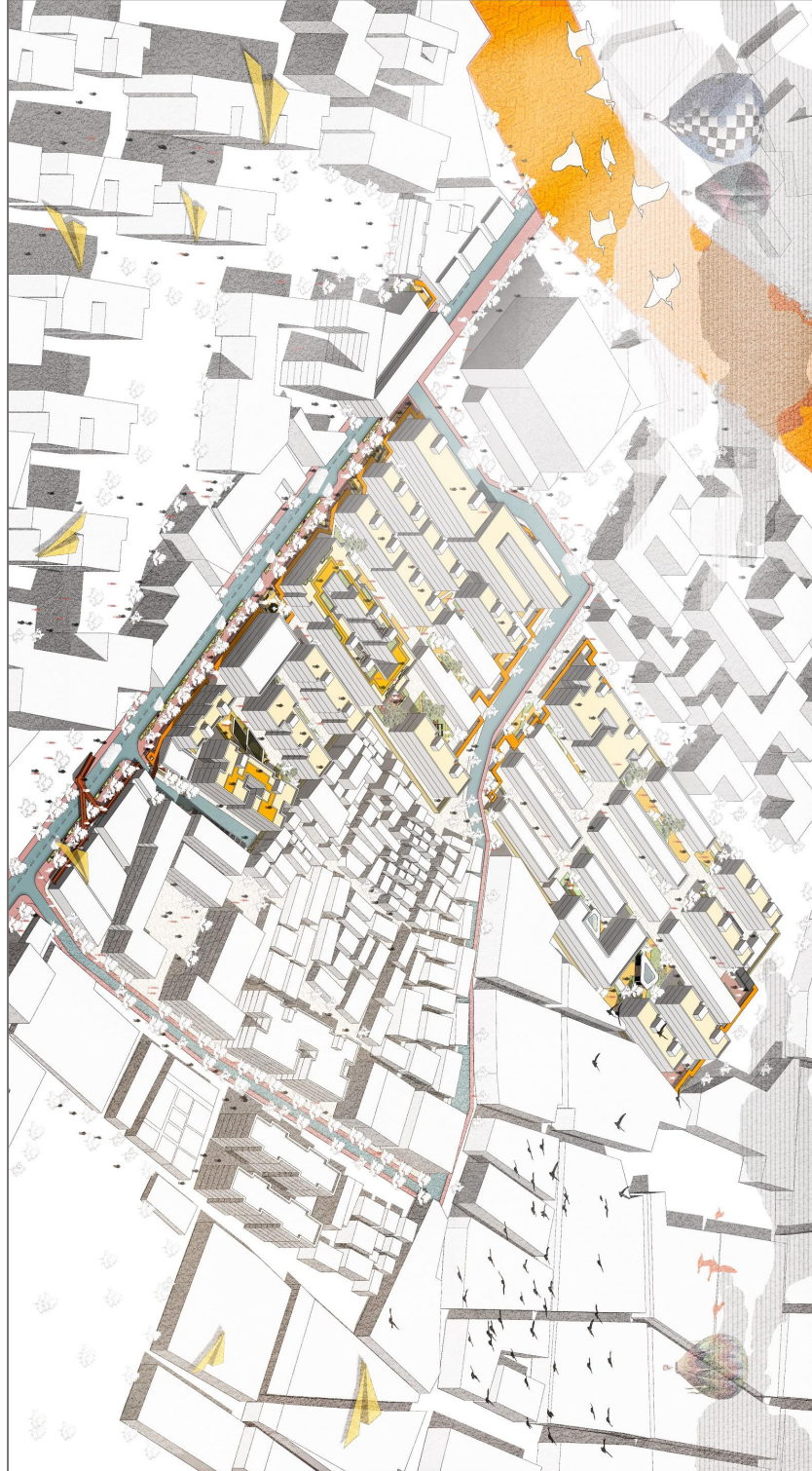


Figure 6- 2 Axonometric Drawing

(Source: author's drawing)





Figure 6- 3 General Plan

(Source: author's drawing)

Firstly, the design scheme is interpreted from the macro level, and the design scope selected for the final design scheme is the northern part of Shigang community, and several compound communities distributed along the two longitudinal roads of Shigang Road and Shigang Avenue on both sides. Through the communication and interview with the community committee, based on the preliminary communication with the Shigang Community Renewal Program compiled by the author, this chapter, combined with the dissertation topic and the analysis of the chapters of this paper on the further design level of the systematic combing and improvement.

For the macro-level design of the master plan, the environment around the community and the utilization strategy of social resources are first analyzed. According to the current situation and future planning of the area, the construction of the neighborhoods around Shigang Community are all new residential developments completed in recent years, with generally higher plot ratios, and there are a number of primary and secondary schools around Shigang Road, with higher overall demand for amenities and greater commercial potential, especially in the southern section of Shigang Road, where the commercial facilities along the street are mainly more active. Therefore, the related demand can give rise to more sustainable commercial facilities and activities, as well as provide more quality demand services to the residents within the community.

In terms of public space and landscape, the northern section of Shek Kong Road is a narrower road, so the transformation is mainly to meet the daily access and use of the residents, while the southern section of the road on both sides of the road is mainly a modern neighborhood, the ground floor of the commercial and public space is more abundant, combined with the two primary and secondary schools along the street, we can focus on creating a richer and high-quality intergenerational shared space in the scope of this section. The southernmost tip of Shigang Road, Shigang Pier, is currently scheduled for renovation as part of the Haizhu Roundabout Path to realize the upgrading of the urban ribbon park. As a resident of the aging community of Shigang, the park along the river can also be used as an important landscape public facility for the ten-minute living circle of the community, providing a high-quality,



large-space landscape node for the daily life of the elderly.

In terms of resource utilization, the overall design of the program needs to consider the southwest side of the scattered and urban village of several units compound, interspersed with the Shigang Street can be used as a link within the community, around which the layout of the public space should be as much as possible to ensure that the overall strategy of open and shared to facilitate the community and the residents of the village of the common use, and is located in which the Shigang Community Health Center should be used as a core resource point to play around the value of the use of public space. The Shigang Community Health Center should also serve as a core resource point to utilize the surrounding public space.



Figure 6- 4 Schematic Diagram of Solution Resource Utilization

(Source: author's drawing)

## 6.2.2 Spatial System Planning

### 6.2.2.1 Spatial Functional Planning

Aiming at the current situation of the community in which the public space lacks design and planning zoning, and the spatial attributes and functions are blurred, the design program firstly carries out the functional thematic planning for the sorted out public space. The public space in Shigang community is scattered, so there is a shortage of large public space. The design takes the summarized strategy in the previous section as the starting point, and utilizes the thinking of integration and

insertion to plan and enhance the functional level of the space.

The design focuses on a few spaces with complete forms and sufficient areas in the community, making them the core public space nodes, which serve as the main activity, socialization and deliberation places in the community, and leading the rest of the community spaces to play the Complete community strategy by leading from the point to the surface. As for the space along the street, the original part of the design is upgraded as a pocket park or square, forming a natural transition between the internal space of the community and the street space, which can also become one of the main places for residents' daily life activities.

Based on the broken form and compact layout of the community's internal space, the design uses functional composite sufficient way to combine leisure, landscape, social activities and other multi-layer attributes and functions of the community's internal public space to form an integrated layout, i.e., in addition to the core nodes and special functions, such as sports and recreation space, the rest of the public space is functionally composite reorganized to combine a variety of functions in the same space, creating a functional flexibility of public space. This creates the functional flexibility of the public space.

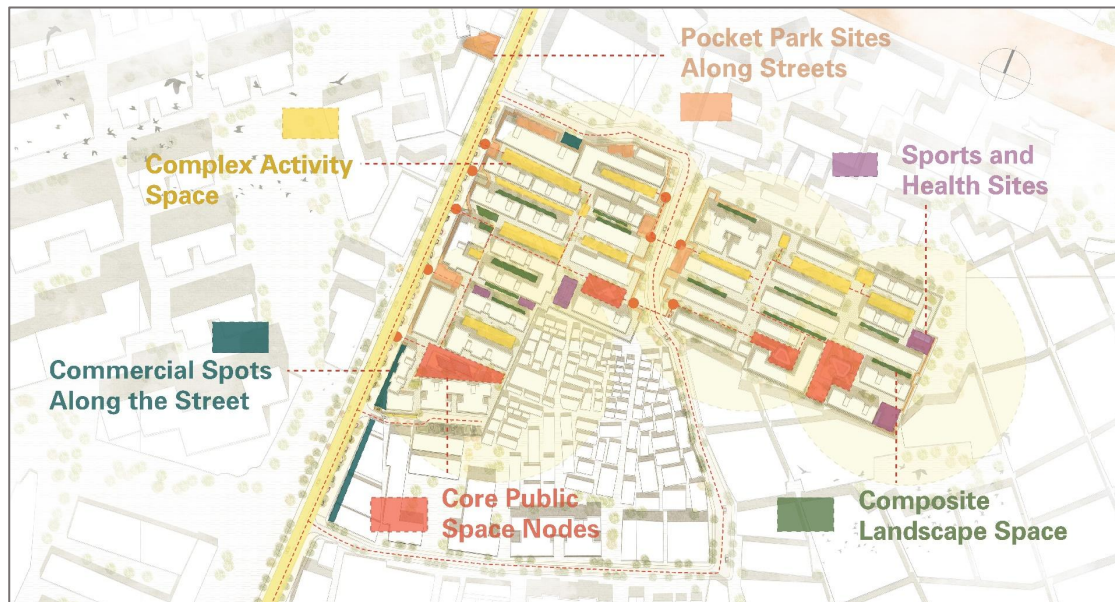


Figure 6- 5 Space Function Theme Planning

(Source: author's drawing)

#### 6.2.2.2 Integration of Spatial System

The Community renewal program is committed to creating a borderless sharing and age-friendly space system model at the spatial level. Considering the daily living habits of the elderly and their high social needs, the program firstly removes a large number of redundant fences and various types of blockages inside the community to realize the interactive integration of internal and external community space, and removes as much as possible the internal blockages to enhance the Spatial Accessibility inside the community and to maximize the service effect of the public space. The overall spatial accessibility of the community is improved to maximize the service effect of the public space. The part of the community connected with the southern side of the village can be divided to a certain extent, and the nodes such as kindergartens and community health service stations can be opened up for shared use and focused design, so as to realize the priority use of community space resources for the internal residents.

Community space system through the same shared concept of planning to form a certain degree of time open community, but also help Shigang Road and the internal Shigang Street and the community along the lateral linkage, prompting the same type of units in the region to form a unified community life circle, to achieve the diversity of life of elderly residents to improve. At the same time, the planning approach also facilitates the enhancement of the vitality of the street stores along the internal road, and ultimately realizes the symbiosis of living patterns with the community residents.

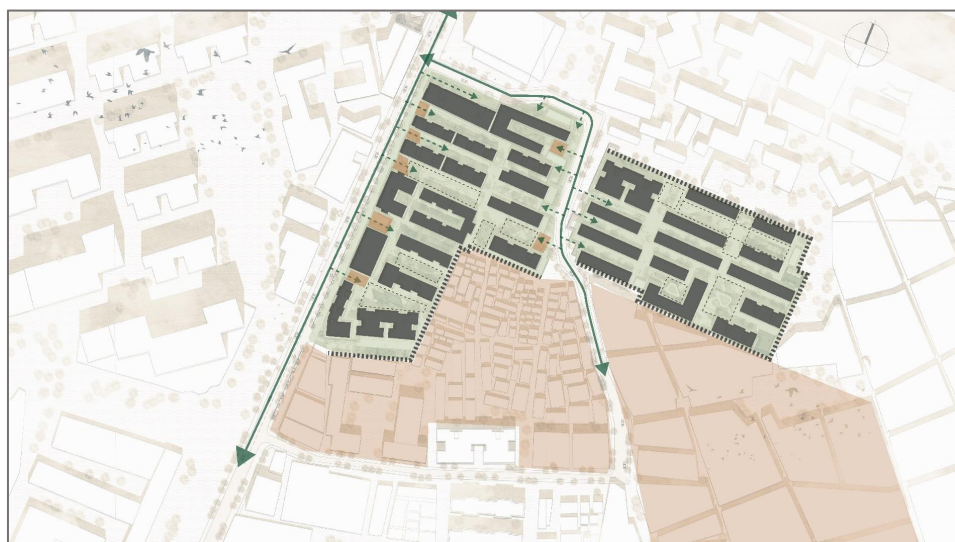


Figure 6- 6 Schematic Diagram of Spatial System Integration

(Source: author's drawing)

### 6.2.3 Transportation Improvements

In response to the transportation system in and around the community, the program design focuses on ensuring the pedestrian experience within the community. Aiming at the phenomenon that part of the space in the community is occupied by parking, which affects the use of residents, the program focuses on the addition of parking space in the southern end of the community to meet the needs of some intergenerational families living in the community for motor vehicle parking, and to increase the completeness and continuity of the community's internal public space, and at the same time, to ensure the safety and comfort of elderly people's activities in the community's internal public space, which is conducive to the design of the later aging-friendly Rehabilitation.

The main urban road around the community is Shigang Road on the west side, which is taken as the main road design stage in the design to improve the pedestrian and vehicular experience. Inside the community, pedestrian nodes are used as a guide for internal transportation, connecting the public space with the internal and external transportation routes of the community. By reconstructing the slow-moving network, adding barrier-free ramps and connecting scattered nodes to form a “one-axis-one-ring” pedestrian system, the time for elderly residents to walk to the

nearest activity venues has been greatly reduced, and accessibility has been enhanced.



Figure 6- 7 Traffic Planning and Design Diagram

(Source: author's drawing)

In order to further promote the integration of the internal and external space and transportation levels of the community, taking into account the activity habits and active paths of the elderly residents, the program uses a garden-style design approach in the design of the community's traffic paths along the street ring, to create a material space and scenario for the circular slow-moving traffic. First of all, the scattered space along the street of the community is utilized to change the monotonous and lengthy urban interface formed under the status quo of ambiguous spatial attributes and low utilization rate.

Both Shigang Road and Shigang Street, which is inwardly oriented to the community, are typical streets in the old city of Guangzhou, with sufficient tree and green coverage, so the layout of the zigzag garden path can be used to create a linear street space with a garden style that is rich in the sense of life. The layout of the promenade is based on the spatial layout of the residential buildings along the street, the green environment inside and outside the fence and the functional characteristics of the street, using internal and external concave-convex design techniques. It not only echoes the internal environment of the neighborhood and widens the view, but also creates an expansive pocket space for the street, and prompts a number of small pocket parks to serve as entry spaces for the community. The promenade space, while



gaining functional value, also realizes the integration of the internal and external environments of the neighborhood, invariably weakening the partition effect of the previous wall, making it a linear place space where both community residents and street visitors can participate.



Figure 6- 8 Community Corridor Loop Traffic

(Source: author's drawing)

### 6.3 Public Space Construction of Complete Community

#### 6.3.1 Hardware Dimension - Comprehensive Upgrade of Spatial Dimension

The design of the hardware dimension corresponds to the spatial layout, Environmental Quality and aging-friendly environment indicators in this paper, and is designed with the strategy of functional integrity, i.e. environmental integrity. Integration, optimization and functional compensation are carried out on the spatial level to improve the design of the Community renewal spatial level, comprehensively optimizing the basic environmental facilities, upgrading and building the landscape, and perfecting the arrangement of ageing-appropriate facilities; at the same time, the internal space of the Community is sorted out and summarized, and the corresponding spatial renewal type model is summarized.



Figure 6- 9 Community Renewal Types of Public Spaces Sorted Out

(Source: author's drawing)

First of all, the spatial functions are integrated and reorganized to enhance the intensity of use of public space, so as to avoid the phenomenon of over-concentration of pedestrian flow in the core space and unused public space. At the landscape level, on the basis of a large number of protected trees in the community, reasonable green zoning and plant ratios are carried out to create a community landscape rich in Lingnan regional characteristics. The landscape area uses a concave form, combined with rain garden technology, which also serves the function of infrastructure. The landscape level is divided into three levels: trees, shrubs and flowers, which can be adequately proportioned to enrich the level of the community landscape, and further promote the residents' spontaneous renewal and maintenance of shrubs and flowers, so as to enhance the sense of belonging to the community's public space.

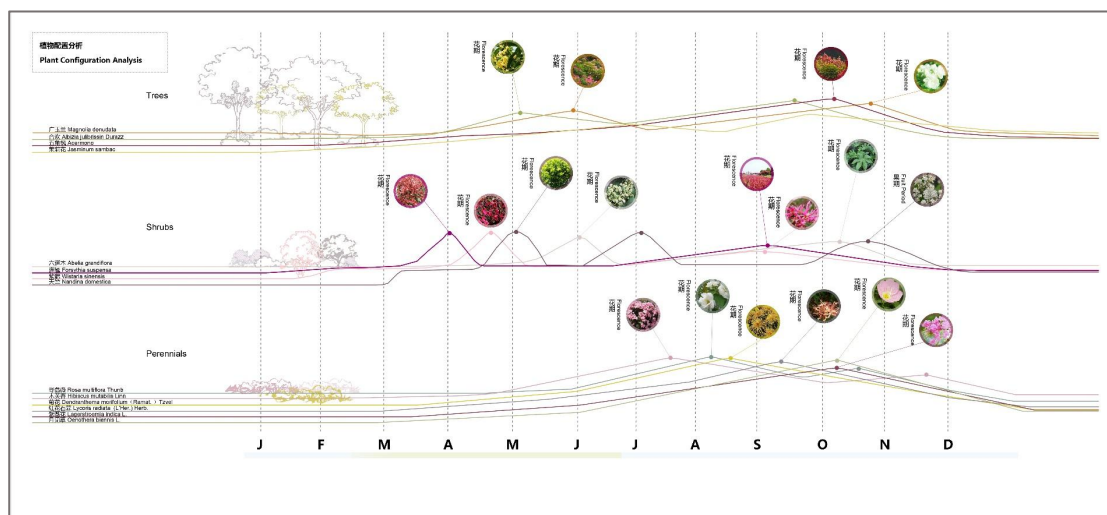


Figure 6- 10 Landscape Plant Configuration Analysis Diagram

(Source: author's drawing)

With regard to the aging hardware in the public space, the program design level chooses to firstly cover the barrier-free facilities comprehensively, such as access ramps and non-slip facilities at the height difference, canopies and safety facilities at the entrance, etc. At the same time, it also covers the emergency call facilities in the key areas of the community to provide assistance to the elderly residents. At the same time, emergency call facilities are covered in key areas of the community to provide ambulance assistance to elderly residents in the community.

### 6.3.2 Software Dimension - Service Mechanism Compensation Improvement

Community renewal of the software dimension of community space corresponds to the aspect of Intelligence Services in the previous evaluation system as well as the two renewal strategies of Service Completeness and Participation Completeness. Combined with the creation of the service and renewal mechanism in the renewal strategy, the space should also be used as an important carrier of the Community renewal system in the material dimension, and the renewal design of the public space should lead to the completeness of the Intelligence Services scene.

The intervention of social resources and the construction of Intelligence Platform guarantees the access of community residents to daily services, while the



comprehensive renewal and quality improvement of the hardware dimension of the public space promotes the development of service activities. First of all, the centralized small parking lots and the increase of commercial functions in the community can bring sustained income as the support of Community renewal, and the upgraded community public space can also become the material compensation for community services as a good carrier.



Figure 6- 11 Software-based Spatial Service System

(Source: author's drawing)

The core public nodes of the community can be flexibly designed to become places for public services such as medical care, recreation, day care, etc., as well as functional venues for discussion and deliberation among residents, neighborhood committees and participating organizations in Community renewal activities; the corridor buildings in the core nodes can be set up as openable modes, which can be used as the corresponding service centers for emergencies and offices for the Community renewal committees in special cases. The pocket plazas along the streets can be set up with temporary commercial spaces in a timely manner, combining them

with the daily needs of the residents; the arrangement of the green space can be introduced into the flowers and landscape style guidance, guiding the Community residents to carry out maintenance and renewal on their own initiative.

Relevant services can be provided by the community committee leading the formation of an online Intelligence Services platform to provide convenient and comprehensive reservation services. The related diverse services can correspond to diverse community public spaces, and form a rich scenario of Intelligence Services in community public spaces through arrangement and combination.

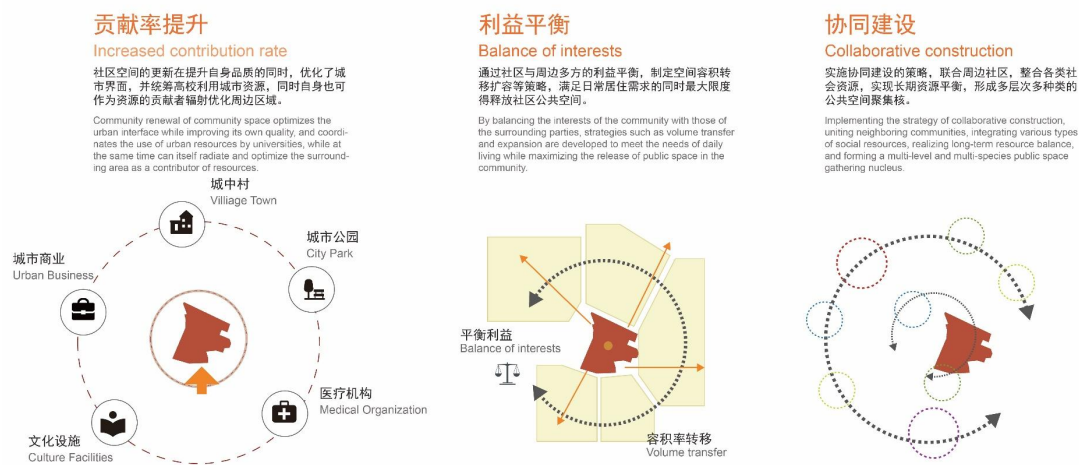


Figure 6- 12 Software Dimension Of Community Renewal Implementation Pathway

(Source: author's drawing)

The specific implementation level of the software dimension requires the participation of multiple social parties in the construction, and at the same time, it is necessary to ensure the long-term reasonable operation of the economic aspect, so as to build an efficient, inclusive and sustainable community ecosystem by optimizing the governance mechanism, enhancing the effectiveness of the services and strengthening the participation of residents. Among them, the focus is on the construction of an interest coordination mechanism, which balances the interests of the community with those of the surrounding parties, develops strategies for spatial volume transfer and expansion, and coordinates the allocation and use of resources. This mechanism aims to meet the daily living needs while maximizing the release of community public space, optimizing resource allocation, and enhancing the overall

vitality of the community; in addition, the community software construction should implement a synergistic construction strategy that unites the surrounding communities, integrates all types of social resources, forms resource sharing and long-term resource balance, and builds a multi-level, multi-species nucleus of public space aggregation through multi-party collaboration to promote the synergistic development of the community and its surrounding areas. Through multi-party collaboration, a multi-level and multi-species public space gathering nucleus is constructed to promote the synergistic development of the community and the surrounding area.

### 6.3.3 Spiritual Dimension - Humanistic Creation and Sustainable Development

The design of the spiritual dimension is divided into two levels: humanistic integrity and developmental integrity. Firstly, the humanistic dimension utilizes the public space to create a cultural scene through the discovery of the community and regional culture. The design of the public space takes into account the use of public festivals, and at the same time, the humanistic creation also includes the living habits of the community residents as former factory workers, forming a spatial detail program design that promotes collective living and leisure patterns. The program design retains the original topography, trees and other natural elements in the site to create familiar scenes for them, thus strengthening the elderly's sense of the continuity of life, and sets up green atriums, back gardens and other public spaces in the space, implanting planting, watering and other plant tending activities to increase the elderly's connection with nature and the land, and creating new place memories for the elderly.

The humanistic design also includes the daily humanistic care of the community, through the improvement of the physical space environment, to meet the emotional experience needs of the elderly. The design of public space focuses on and carries out a new model of elderly care with learning and activities that meet the physiological and psychological characteristics of the elderly as the core content, and meets the

needs of the elderly for multiple functions such as communication, learning, entertainment, recreation, and health care.

Development integrity mainly refers to the dynamic balance and elasticity strategy in renewal. Community renewal of the old in the actual situation is subject to economic and other factors, may not be able to instantly realize all the contents of the design program, therefore, in the design of the development intensity of the distinction between the development intensity of the core nodes of the key areas of development intensity, commercial and service functions for the first update, and then the focus of the update will be transferred to the interface along the street and the internal spatial boundaries of the area more Complete community renewal of some of the areas of lower intensity. For some areas with lower intensity, it can be completed through dynamic and continuous renewal activities.



Figure 6- 13 Schematic Diagram of the Phased Development of Public Space

(Source: author's drawing)

The first phase of the renewal and the initial phase mainly focus on the activation of space and the catalyzing of humanistic activities, focusing on the activation of the community public space and making it a catalyst for humanistic activities; in the middle phase of the renewal, the focus shifts to the creation of space with humanistic care to further strengthen the sense of community identity; the long-term goal focuses on the realization of the in-depth integration of humanistic scenarios into the space

and the establishment of a mechanism for continual renewal that integrates humanistic care and cultural inheritance into the daily operation of the Community renewal space. The long-term goal focuses on realizing the deep integration of humanistic scenes and spaces, and establishing a continuous updating mechanism to integrate humanistic care and cultural inheritance into the daily operation of community spaces.

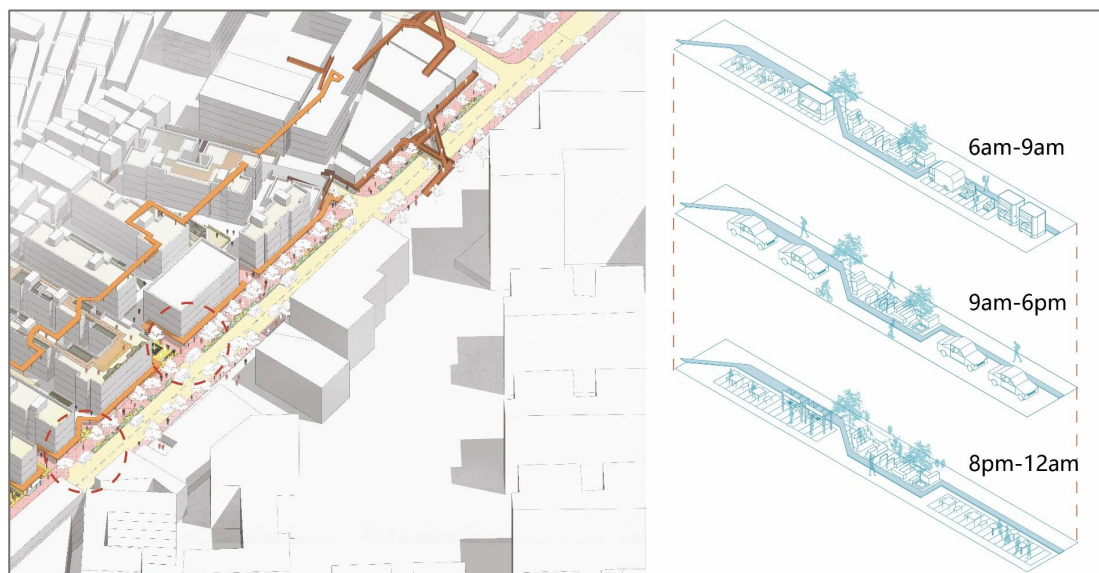


Figure 6- 14 Schematic Diagram of Flexible Adaptation Design in Different Time Periods

(Source: author's drawing)

Since the overall space of the community is relatively tight, the design uses flexible strategies to maximize the benefits of the space, and the program mainly applies flexible strategies from the aspects of function and timeliness. The public space adopts a variety of functional planning, including leisure, entertainment, activities and other uses, and can be converted to other modes of use in a timely manner by reserving space for functional transformation. At the level of time planning of space, functional themes are set for different time periods of the same space to promote its maximum utilization. For example, for the space along Shigang Road, three time themes are categorized for planning and design. During the time period of 6-9 am, the pressure of road traffic is low.

The street activity crowd is dominated by the community's elderly residents, in this time period can be used to design the space along the street to set up flexible commercial locations to meet the needs of the elderly life-based, such as healthy breakfast store, etc.; 9:00 a.m. to 6:00 p.m. this daytime phase of the street is busier,



the diversity of the crowd's travel and activity demand is higher, so the street flexibility can be used as a place for temporary parking, resting; 6:00 p.m. after the evening can be used as a place for residents to relax. After 6 p.m., the evening can be used as a place for residents to spend their leisure time and exercise, or to provide a suitable place for the stall economy, forming a vibrant street space.

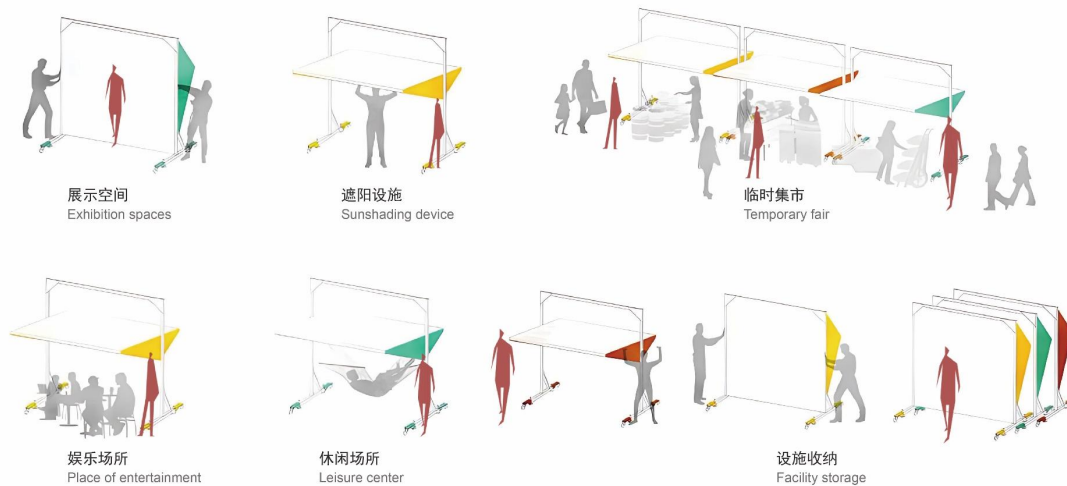


Figure 6- 15 Schematic Design of Resilient Adaptation Over Time

(Source: author's drawing)

Complete community construction in the Humanistic Spirit dimension also includes the level of flexible design adaptation, utilizing multi-functional installation elements in space design, such as planters, structures, etc., and adopting the mode of “basic modules + functional plug-ins”, combining and replacing modules according to different needs, so as to enhance the use effect and variety of community public space. Function. The modularized devices can meet the diversified functions and are easy to store, which is conducive to the spontaneous use of space by residents on a daily basis and promotes the occurrence of daily life behaviors at the same time. The modular design not only reduces the construction cost, but also provides the basis for the dynamic development of the community in the future.

## 6.4 Core Nodes Design

### 6.4.1 Improvement of Street Space Along Shigang Road

For the most important Shigang Road along the community, the program design

chooses to focus on its creation. First of all, through the road to the community's various pockets of plaza entry space, and the design of the corridor to form a concave and convex, walking changes in the rich experience of street space. The elevated roadbed of the sidewalk is leveled to protect the original green landscape design of the street while integrating the street space into a more complete interface, which is utilized to provide seating and other recreational tools as well as a site for temporary commercial activities.

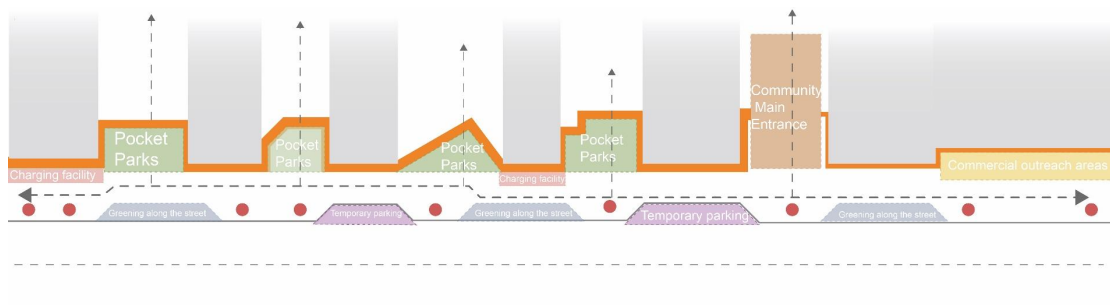


Figure 6- 16 Functional Planning Diagram of the Road Along the Street

(Source: author's drawing)

For the most important Shigang Road along the community, the program design chooses to focus on its creation. First of all, through the road to the community's various pockets of plaza entry space, and the design of the corridor to form a concave and convex, walking changes in the rich experience of street space. The elevated roadbed of the sidewalk is leveled to protect the original green landscape design of the street while integrating the street space into a more complete interface, which is utilized to provide seating and other recreational tools as well as a site for temporary commercial activities.

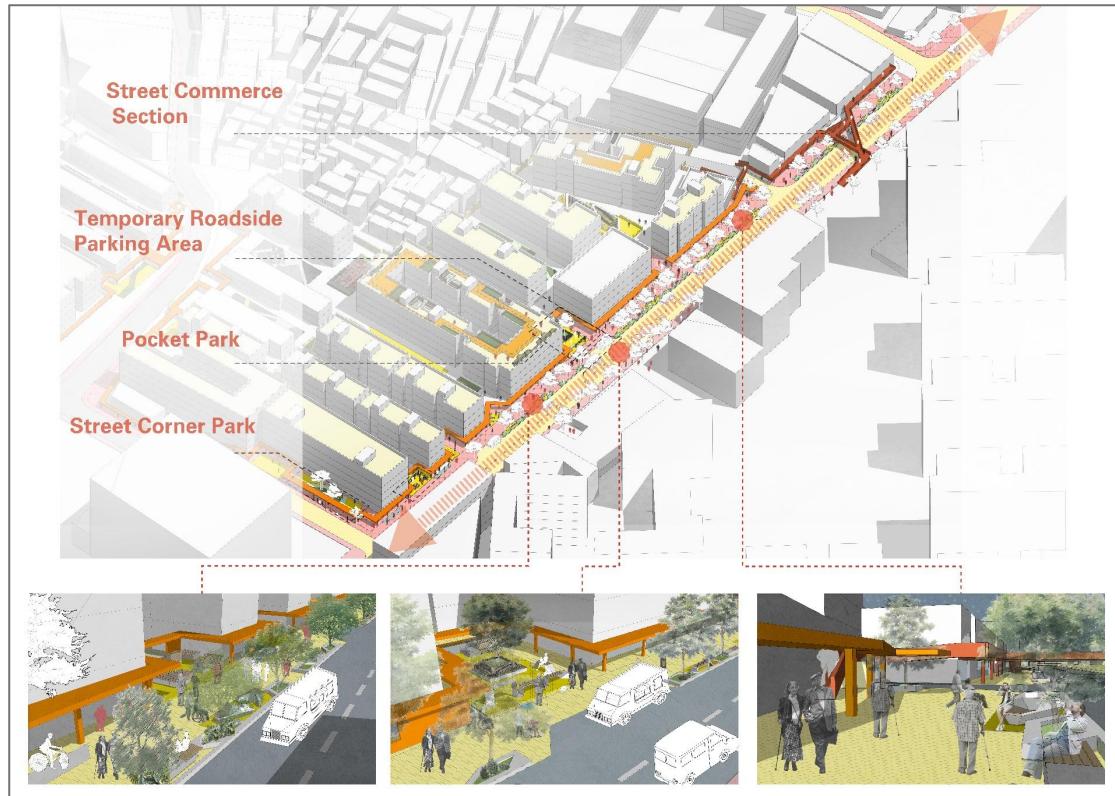


Figure 6- 17 Shigang Road Street Space Renovation Design

(Source: author's drawing)



Figure 6- 18 Renovation Effect Diagram of the Southern Section of Shigang Road

(Source: author's drawing)

The street has optimized the vertical zoning through integrated design to enhance the efficiency of access and the safety of leisure functions. The commercial function along the street in the southern section of the street is partly increased by organizing



the unauthorized structures on the second floor along the street, and the commercial space connection on both sides of the road is enhanced by the external corridor and small footbridge, which can also alleviate the gap between the pedestrian experience on both sides of the road to a certain extent.

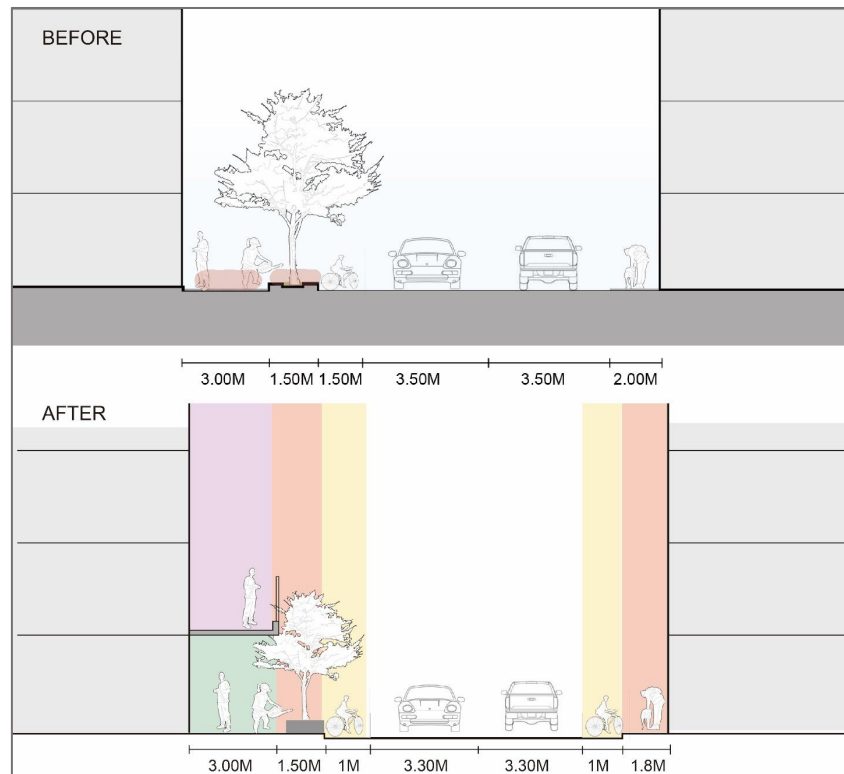


Figure 6- 19 Schematic Diagram of Road Profile Improvement of Shigang Road  
(Source: author's drawing)

## 6.4.2 Utilization of Roof Spaces

Since the public space on the ground is limited, the program chooses to expand the vertical dimension in the level of spatial expansion, using the rooftop of the residential building to create a living place for leisure and socialization. As the fifth façade of urban buildings, the roof space not only complies with the aesthetics and harmony of the urban interface, but also serves as a shared space for the community in the residents' perception scale. Just like the public space on the ground level of the community, the rooftop portion of the building can be utilized to carry out the residents' daily activities, such as sports and exercise, social activities, or participation in the community's daily activities.

Considering the needs and activity characteristics of elderly residents, the program selects areas with good conditions for roof space renovation. Taking advantage of the small spacing and high density of buildings in the old community, the roofs of neighboring residential buildings are connected to form a circular channel to create an exercise trail suitable for the scale of activities of the elderly. Considering the preference of elderly residents for flower planting and maintenance, the design provides a flower garden on the roof, leaving the right to use and maintain the garden to the residents, which promotes the spontaneous maintenance of community affairs and enhances the residents' sense of belonging to the Community and their willingness to participate in Community renewal and development decisions.



Figure 6- 20 Roof Renovation Plan

(Source: author's drawing)

In addition to the functions of sports and landscape, the rooftop space also utilizes the boundary nodes to arrange spaces with leisure and social themes, and encourages residents to arrange specific content such as shared furniture to enhance their sense of commonality. In addition, while meeting the needs of residents' use, the design of the roof space also considers the response to renewed technology by installing a solar panel-covered shading roof, which provides a shading and resting effect while enhancing the resource utilization of the Community, and enhancing the sustainable development of the Community.

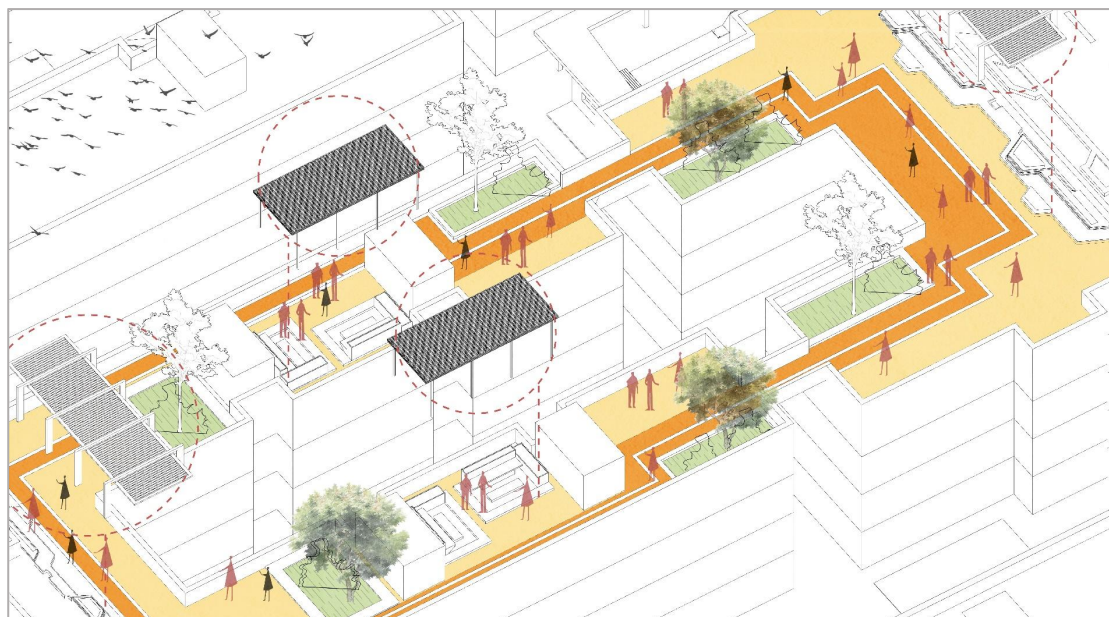


Figure 6- 21 Roof Renovation Axial Rendering

(Source: author's drawing)

### 6.4.3 Design of Street Corner Space Nodes

As a combination of urban functions such as community commerce, old community and modern community, the corner space is designed with an open and sharing attitude. First of all, the commercial value of the stores along the street in the corner area is high, and the design treatment of this part can be combined with its own value to create diversified public use space and increase the activity of the people in this area. In terms of design approach, the concept of community entry node corridor is continued, but the difference is that the corridor in this area is designed to create a sense of enclosure of the plaza space, and form a staggered spatial node with the street traffic space.



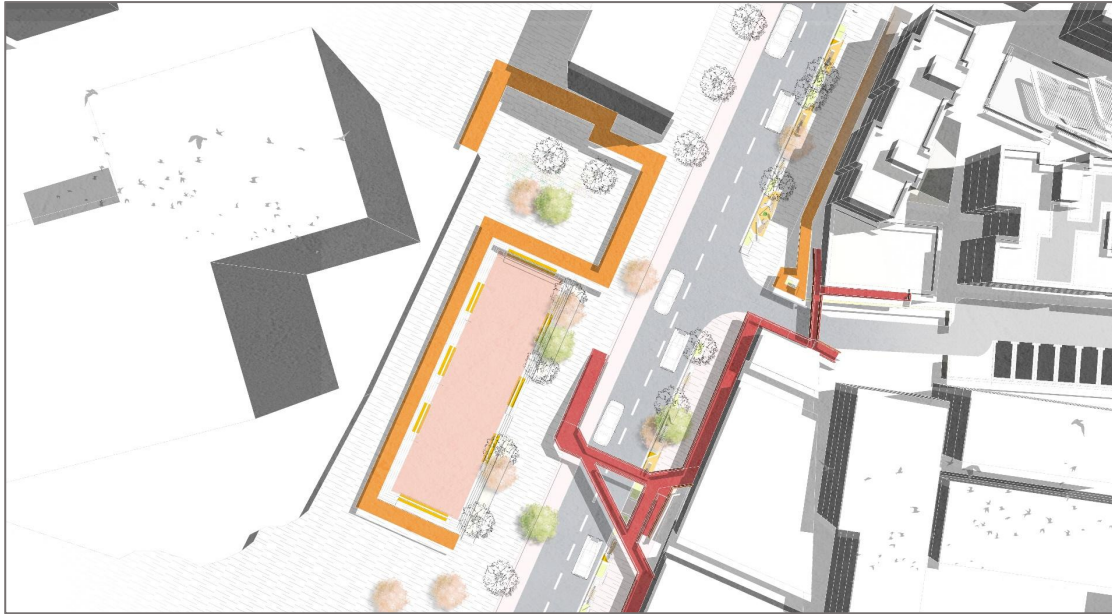


Figure 6- 22 Street Corner Space Node Design Plan

(Source: author's drawing)

The concave plaza along the street is processed to form a spatial staggering of heights and produce a centripetal cohesive spatial form, which naturally attracts the flow of passers-by. The concave plaza can be flexibly arranged in a variety of ways to fully utilize its spatial potential. It can be used for commercial outreach activities during the daytime, and as a sports ground for social activities such as square dancing for the residents of the surrounding communities in the evening, and the combination of steps and seats also provides a hardware dimension to facilitate the social activities.



Figure 6- 23 Street Corner Space Node Design Renderings

(Source: author's drawing)

#### 6.4.4 Design of Public Space Nodes within the Community

##### 6.4.4.1 Community Living Room Public Space Node

The core node at the entry space of the community is taken as the “community living room”, which serves as the daily activities and leisure place for the community residents, and can be used as a hub to connect the rest of the public spaces or buildings in the community.

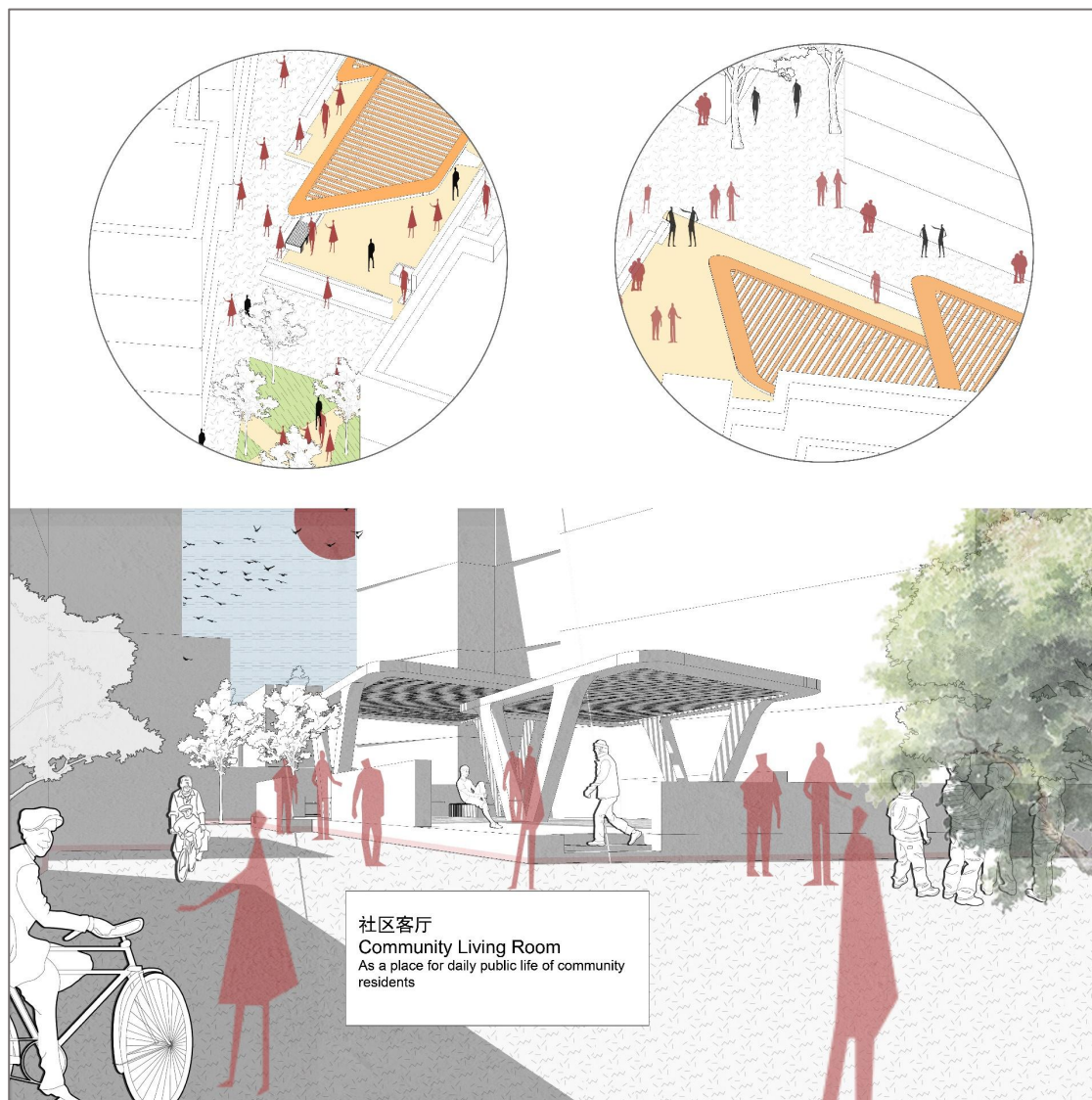


Figure 6- 24 Community Living Room Public Space Node Renderings

(Source: author's drawing)

Taking into account the original topographic characteristics of the site and the



activity patterns of the population, the design retains the slightly elevated platform and the tendency of the residents to gather in this area, designing this area as a multi-functional space to meet a variety of needs. The original dilapidated structures are demolished and renewed, and a new switchable corridor structure is built as a visual and spatial focal point to meet the residents' activities under different weather conditions, and can be used as a temporary office and meeting place when holding specific activities. At the same time, this node can be used as a preferred area for residents' shared furniture strategy, encouraging residents to carry out their daily activities with spontaneous participation.



Figure 6- 25 Community Living Room Public Space Node Renderings

(Source: author's drawing)

The community living room not only becomes the theme space for residents' activities, but also serves as the core node of the community space connecting the street, community transportation network, community public space and buildings and other spatial elements. At the same time, by removing the courtyard wall and leveling the road base at the community entrance space, the connection between the entrance space and the urban space appears more holistic, which also enhances the harmony and unity between the community landscape and the urban interface.

#### 6.4.4.2 Community Rain Garden Node Design

The rain garden utilizes the public space of the community with the current

situation of various arbor greenery and other elements, combined with the previous technical strategy to create a composite landscape space, the design of the rain garden takes full account of the ecological sustainability, through the combination of concave green space and permeable paving, effective collection and filtration of rainwater, reduce runoff pollution, and replenish groundwater. The hardware dimension in the previous design provides residents with a reference for landscape creation schemes, provides a rich reference for landscape creation, and encourages spontaneous renewal behavior.

The center of the piece of green space can become the central node of the spatial hierarchy by installing interesting structures as well as resting seats, which can be used as a place for residents to relax and socialize, as well as a venue for temporary activities. The garden is also equipped with multi-functional shared planters, which can be freely placed by residents' own assembly and adjustment, and their interiors can be adjusted at any time to form the vertical dimension landscape of the community garden.

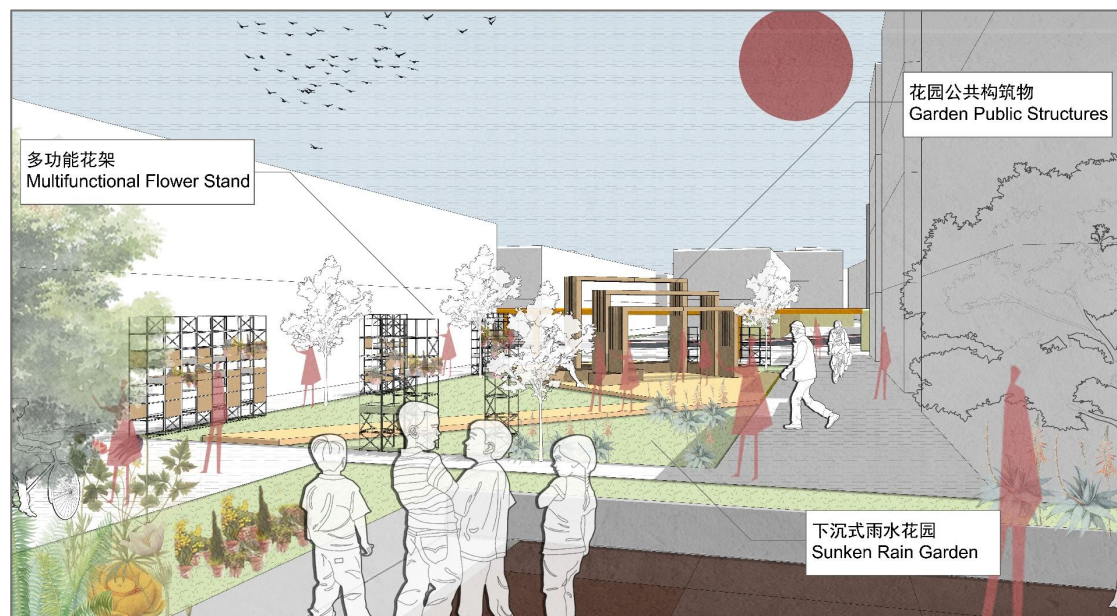


Figure 6- 26 Community Rain Garden Rendering  
(Source: author's drawing)

#### 6.4.4.3 Community Station Public Space Node

Through the analysis of the previous research results and evaluation results, it can be learned that the residents have a high tendency to use the space between the

buildings within the community, so the design of this area as a Community Station, to undertake the daily rest of elderly residents, day care and other functions, the node is not only a physical space renewal, but also the concentration of community services and humanistic care. Near the east side of the community, the traffic pressure on Shigang Street is high, and the traffic situation is quite chaotic, so the community station area is arranged in the community and close to the access space of the residential building, which to a certain extent avoids the influence of the street and the part of the urban village.

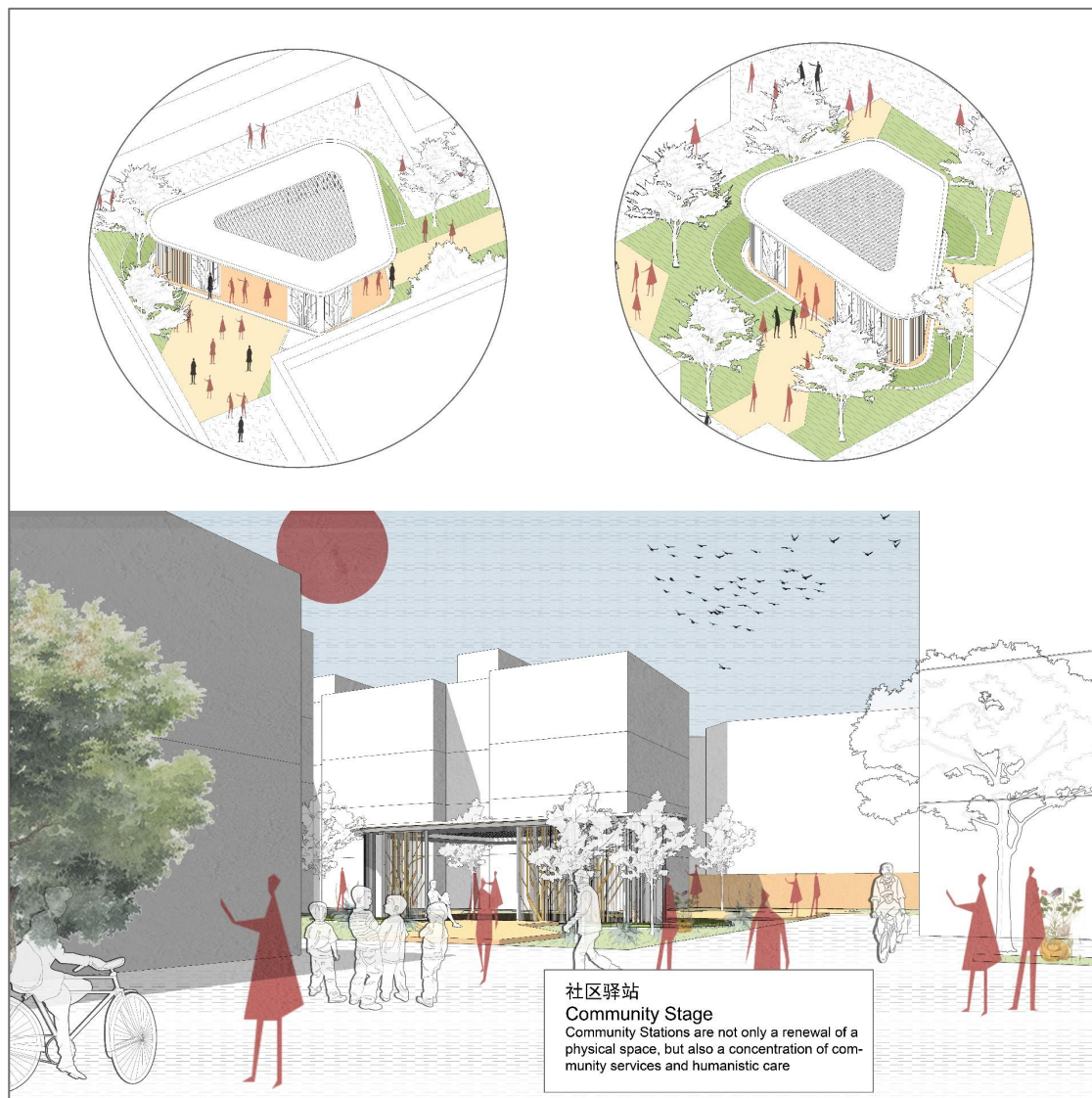


Figure 6- 27 Community Station Public Node Renderings

(Source: author's drawing)

The design level of the space continues the design idea of public space,



integrating the activity space and landscape space, and placing an open post building in the core of the space to take care of the elderly residents. The remodeling of the public space enriches the spatial level and promotes community life. The community station is not only a place for the daily activities of the elderly, but also an important platform for community culture and social interaction, such as organizing various activities on a regular basis to promote exchanges and interactions among the elderly and enhance their sense of community belonging and identity. At the same time, the operation of the post will also lead to the improvement of the overall service level of the community and promote the harmonious development and sustainable renewal of the community.

## 6.5 Summary of this Chapter

This chapter takes Guangzhou Shigang community as a practice case, based on the previous theoretical research, case analysis and evaluation and assessment results, combining with the renewal strategy to develop the renewal design of public space under the concept of Complete community.

At the macro level, firstly, in the spatial system planning, the focus is on spatial function planning and system integration. In terms of functional planning, to address the problems of lack of design and ambiguous functions of the community public space, the core public space nodes and pocket parks are created through functional thematic planning, and the functional composite mode is adopted to enhance the efficiency of space utilization. In terms of system integration, redundant walls and shelters are removed, Spatial Accessibility is improved, and a shared space system without boundaries is constructed to promote the integration of the community inside and outside and the formation of a vibrant living circle. The design of the traffic renovation focuses on guaranteeing the walking experience, and enhances the safety and comfort of community traffic by adding parking lots, optimizing pedestrian nodes, and designing landscaped streets. The design of the community corridor loop not only enhances the walking experience, but also expands the street space, creating a linear place shared by community residents and visitors.

The meso level is a trinity of hardware, software and spiritual dimensions of the Complete community. The hardware dimension upgrades the community public space through spatial integration, environmental optimization and Spatial Aging Adaptability renovation; the software dimension improves the community service and management mechanism by relying on the Intelligence Services platform and digital governance; and the spiritual dimension integrates cultural shaping and humanistic care to create a cultural scene, promote community identity, and safeguard the community's sustainable development through resilience strategies.

The micro-level design interpretation is shown through the design of core nodes, including the space along Shigang Road, roof gardens, corner space and public space nodes within the community. Through the design of specific nodes, the design level and depth are expanded, further echoing the renewal strategy in the previous section.

## Conclusion

### Conclusion of the Study

With the acceleration of China's urbanization and the aging of its population, the focus of Urban Renewal has shifted from expansion to quality improvement, focusing on the optimization of stock space and functional remodeling. The traditional Urban Renewal model often intervenes from a macroscopic perspective, making it difficult to meet the special needs of the elderly in terms of physical space renovation, Spatial Aging Adaptability design, cultural kernel reshaping, and transformation of the community governance model. This paper focuses on this reality and introduces the concept of Complete community into the field of Dual-aged community public space renewal, aiming to provide new theoretical perspectives and practical guidance for Urban Renewal through systematic theoretical research and practical exploration. This paper focuses on the public space renewal of Dual-aged community under the concept of Complete community, and draws the following conclusions through theoretical research, case analysis, current situation research, evaluation system construction and design application:

#### (1) Theoretical and Methodological Level

Guided by the concept of Complete Community, this study conducts systematic theoretical research, case analysis, field research and renewal strategy development for the public space renewal of Dual-aged community. The study constructed a comprehensive evaluation system covering three dimensions, five criteria layers and fifteen indicator layers, which provides a quantitative tool for the comprehensive assessment of public space in Dual-aged communities. Combined with the Fuzzy Comprehensive Evaluation Method, the strengths and weaknesses of Community renewal spaces are accurately identified, providing a scientific basis for the formulation of renewal strategies. At the same time, the systematic renewal strategy and methodology of Dual-aged community public space under the concept of Complete Community is proposed, which integrates six aspects, namely, functional

integrity, environmental integrity, service integrity, participatory integrity, humanistic integrity, and development integrity, and forms a three-dimensional integral renewal logic, namely, “Hardware-Software-Spirit”, which provides a comprehensive theoretical framework and practical approach to the community renewal.

## **(II) Practical Level**

Taking the Shigang Community in Guangzhou as a practical case, the evaluation system and the renewal strategy constructed are applied to complete the Community renewal design. Through comprehensive evaluation, the scores and weaknesses of the community's indicators are determined, and the design includes optimization of spatial layout, improvement of Environmental Quality Services, improvement of service mechanisms, shaping of Humanistic Spirit, and development of resilience, creating a more livable, Intelligence Spirit, and inclusive community environment for residents.

## **Research Innovations**

### **(1) Innovative construction of evaluation system**

This study combines the existing norms and regional construction guidance documents, combs through the relevant literature in the research field, and innovatively constructs an evaluation system for Complete community public space, which comprehensively considers the three dimensions of community public space, namely, material, social, and spiritual, and realizes multi-dimensional and multi-level quantitative assessment through the hierarchical analysis method and fuzzy comprehensive evaluation method, in order to reflect the current situation of the community public space in a comprehensive and objective way as much as possible and to provide a renewal design to provide precise direction guidance, filling the research in the field of comprehensive evaluation of public space in Dual-aged community.

### **(2) Systematic Integration and Practical Application of Renewal Strategies**

The proposed public space renewal strategy for Dual-aged community renewal under the concept of Complete community covers six aspects, namely, functional

integrity, environmental integrity, service integrity, participation integrity, humanistic integrity and development integrity, forming an organic and integrated strategy framework. While the systematic and integrated strategy focuses on the improvement of physical space, it also emphasizes the shaping of community services, residents' participation and Humanistic Spirit, providing an all-round strategic plan for the comprehensive upgrade of community public space.

At the same time, the Shigang community in Guangzhou is used as a practical case study, combining theoretical research with actual projects to demonstrate the operability and practical effects of the proposed strategies and methods. The design results have solved the current problems of public space in Shigang Community to a certain extent, and also provided valuable references and lessons for other Dual-aged community renewal, with certain demonstration and reference significance.

## **Research Limitations and Prospects**

Although this study has achieved certain results at the theoretical and practical levels, there are still some limitations. Firstly, the specific research and design object selected in this paper is a typical Dual-aged community in Guangzhou, which has certain regional and cultural particularities, and the universality of the proposed strategies and methods needs to be further verified; secondly, due to the limitations of the research time and the focus of the thesis, the process of constructing and verifying the evaluation system may not be able to cover all the relevant factors, and the determination of the index weights may be subjective; finally, the application part of the design scheme mainly focuses on the renewal design of the community public space, and may lack the consideration of the residents' opinions on the use of the space. Finally, the application part of the design program mainly focuses on the Community renewal design of public space, which may lack the consideration of residents' opinions on the use of the program. Therefore, future research can be expanded and deepened in the following directions:

### **(1) Further Optimize and Validate the Evaluation System**

Further apply and validate the constructed evaluation system in a wider range of

community types and geographical contexts, collect more data to optimize the weights of indicators and scoring criteria, and improve the scientificity and universality of the evaluation system. Consideration can be given to combining technical means such as spatial syntax to conduct in-depth research on the determining conditions and influencing factors of community public space under the concept of Complete community from a deeper dimension, so as to provide richer perspectives and bases for the theory of the evaluation system.

## **(2) In-Depth Exploration of the Synergistic Effect of Multi-Dimensional Community Renewal**

Continue to explore and summarize the mechanism of Complete community renewal strategy with the unified and coordinated effect of the three dimensions of “hardware-software-spirit”, the comprehensive strategy and method of overall community renewal, and improve the theoretical summary of the revitalization and renewal of the Dual-aged community. At the same time, we will comprehensively explore the synergistic relationship between community renewal of public space and other elements of renewal, and integrate the knowledge and methods of urban planning, architecture, sociology, environmental psychology and other fields through interdisciplinary research perspectives, in order to provide more comprehensive and in-depth theoretical support and practical guidance for Community renewal.

## **(3) Strengthen Research on Long-Term Operation and Maintenance**

Continue to explore the dimension of Complete community software as a mechanism to study the establishment of a long-term management mechanism for community public space, such as the introduction of professional property management, the establishment of community self-governance organizations, and the development of conventions for the use and maintenance of public space. Continue to pay attention to the long-term operation and maintenance of Community renewal of public space, and study sustainable management mechanisms and funding models to ensure the continued vitality and quality of public space. It is possible to learn from successful community operation cases at home and abroad, and further summarize the long-term operation mechanism suitable for the situation of regional characteristics by

combining with the local actual situation.

#### **(4) Strengthening Community Participation and Joint Construction and Sharing**

Further study how to more effectively stimulate community residents' enthusiasm for participation and sense of co-construction through the construction of human software and spiritual dimensions of Complete community, and promote residents' transformation from passive acceptance to active participation through improving the mechanism of residents' participation, strengthening community education and publicity, etc., so as to realize the co-construction and sharing of public space in the community. Explore the establishment of community participation platforms and channels.

### **Summary and Outlook**

The construction of Complete community is a large and complex systematic project, and the construction of its content system and strategy aims to provide clear guidelines and directions for community renewal practice. As technology advances and time passes, the meaning of Complete community will become richer and richer, and the content of old neighborhood renewal will be deepened as well. Therefore, it is necessary to continuously improve the content system and summarize the transformation strategies in the process of long-term practice, so as to ensure that the concept of Complete community can more accurately guide the transformation practice of old neighborhoods.

At the same time, due to the epidemic factor and the limitation of human and material resources, this study was unable to conduct a larger-scale research on the old neighborhoods, and part of the research content may be insufficiently detailed. In addition, the scope of questionnaire data acquisition is relatively limited, and the sample size needs to be further expanded to more comprehensively reflect the real situation of the transformation of old neighborhoods. In view of the limitations of personal knowledge and practical experience, this paper is inevitably shallow in the research process and the argumentation is not rigorous enough, to be summarized in the subsequent research and practice, to be improved.

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## Appendix

### Appendix I Steps of Factor Weight Calculation in Analytic

#### Hierarchy Process

##### Step 1 Build a hierarchical structural model

When using the hierarchical approach to analysis, the problem is first organized into three main levels: the top level (purpose level), the middle level (criterion level), and the bottom level (solution level).

##### Step 2: Construct judgment matrices for each level.

Within the criterion layer of the judgment matrix for each level, the weighting of each criterion in the measurement of the objective may vary, so the proportion in the mind of the decision maker can be judged by quoting the numbers 1-5 and their reciprocals as a scale, which is shown in the following table:

Appendix Table 1-1 Judgment Matrix Scale Definition Table

Scale	Content Description
1	Indicates that the two factors have equal importance.
2	Indicates that one factor is slightly more important than the other.
3	Indicates that one factor is significantly more important than the other.
4	Indicates that one factor is strongly more important than the other.
5	Indicates that one factor is absolutely more important than the other.
Reciprocal	If the importance ratio of factor $I$ to factor $j$ is $a_{ij}$ , then the importance ratio of factor $j$ to factor $I$ is $a_{ji} = 1/a_{ij}$ .

(Source: compiled by the author based on relevant information)

##### Step 3 Calculate the importance ranking

(1) Calculate the geometric mean of all factors at each level of the judgment matrix:

$$\bar{W}_i = \sqrt[n]{\prod_{j=1}^n a_{ij}} \quad i=1, 2, 3, \dots, n$$

$$\text{得 } \bar{W}_i = (\bar{W}_1, \bar{W}_2, \dots, \bar{W}_{n-1}, \bar{W}_n)^T$$

(2) Normalization processing

$$W_i = \frac{\bar{W}_i}{\sum_{i=1}^n \bar{W}_i} \quad i=1, 2, 3, \dots, n$$

得  $\bar{W}=(\bar{W}_1, \bar{W}_2, \dots, \bar{W}_{n-1}, \bar{W}_n)T$  , 即得到各层次各因子相对权重。

#### Step 4 Calculation of coherence indicators CI

(1) The formula for calculating the consistency index  $CI = \frac{\lambda_{\max} - n}{n - 1}$  ,  
where  $\lambda_{\max}$  is the maximum eigenvalue of the judgment matrix.

(2) Finding the consistency indicator RI

Appendix Table 1-2 Judgment Matrix Scale Definition Table

N	1	2	3	4	5	6	7	8	9
RI	0.00	0.00	0.52	0.89	1.12	1.24	1.36	1.41	1.46

(Source: compiled by the author based on relevant information)

(3) Calculate the consistency ratio with the formula:  $CR = \frac{CI}{RI}$

Consistency test requirements, such as  $CR \leq 0.1$  then the consistency results of the matrix is reasonable, otherwise it is considered that the consistency results of the matrix is too poor, and need to be compared again to determine.

Finally get the ranking weight of each program in each element on the target, the total hierarchical ranking also need to make consistency test, calculate the synthetic weight of each layer of elements on the total goal of the system, and the ranking of each alternative program.



## Appendix II Scoring Scale for Community Public Space Evaluation Indicators

### A Study of Public Space Renewal in Dual-aged Communities under the Concept of Complete Communities

Dear Auditor,

Hello, This study aims to explore the field renewal study of public space in urban Dual-aged community to provide more and better public space for the elderly. We would like to ask for your suggestions on the indicators that can be used to evaluate the public spaces in Dual-aged communities. This study is a non-nominal questionnaire and the information you provide will only be used for academic statistical analysis, and will never be published or used for any other purposes, so please feel free to fill in the form, and we would like to express our sincerest gratitude to you.

School of Architecture, South China University of Technology

Sincerely, Zeng Zezhong, Graduate Student

**Description and Scoring of Indicators:** Below are the elements of the indicators in the three dimensions, please refer to the descriptions of the indicators to rate the importance of the indicators from 1 to 5. The score is 5 - extremely important, 4 - very important, 3 - important, 2 - average, 1 - not very important.

Indicator	Description	1 (Not Important) → 5 (Very Important)
<b>Spatial Layout</b>		
Spatial Accessibility	The extent to which community members can conveniently and quickly reach the space.	1 ... 2 ... 3 ... 4 ... 5
Functional Integrity and Recognizability	The completeness and ease of identification of the functions and facilities provided by the space, such as functional facilities included in the space.	1 ... 2 ... 3 ... 4 ... 5
Spatial Form	The appearance, layout, and form of the space, such as the size and shape of the space.	1 ... 2 ... 3 ... 4 ... 5
<b>Environmental Quality</b>		
Spatial Quality	The environmental conditions and material quality provided by public spaces.	1 ... 2 ... 3 ... 4 ... 5
Landscape Aesthetics	The beauty and diversity of landscape design, overall style control of the community environment, such as the appearance of landscapes, visual impressions, and style features.	1 ... 2 ... 3 ... 4 ... 5
Maintenance	The cleanliness of public areas, the maintenance of landscape facilities and infrastructure, etc.	1 ... 2 ... 3 ... 4 ... 5
<b>Intelligence Services</b>		
Service Quality	The professionalism and satisfaction of community management services related to public spaces.	1 ... 2 ... 3 ... 4 ... 5
Management Mechanism	The convenience of intelligent management mechanisms and models related to public	1 ... 2 ... 3 ... 4 ... 5

	spaces.	
Resident Participation	The extent of residents' participation in community management and service improvement.	1 ... 2 ... 3 ... 4 ... 5
<b>Humanistic Spirit</b>		
Demand Satisfaction	The satisfaction of residents' psychological needs for humanistic living, such as temporary facilities, reading spaces, and service functions provided.	1 ... 2 ... 3 ... 4 ... 5
Living Scene	The promotion and creation of daily life scenes for residents, collective memories, and living habits, such as leisure and entertainment for the elderly.	1 ... 2 ... 3 ... 4 ... 5
Neighborhood Interaction	The promotion of community relationships and group interaction activities, such as providing comfortable communication spaces and facilitating social and cultural activities.	1 ... 2 ... 3 ... 4 ... 5
<b>Space Aging Adaptability</b>		
Safety	The provision of safety guarantees and related safety facilities in the space, such as anti-slip strips, handrails, emergency call devices, and emergency aid facilities.	1 ... 2 ... 3 ... 4 ... 5
Comfort	The comfort of space use, such as temperature, humidity, and lighting for the elderly.	1 ... 2 ... 3 ... 4 ... 5
Accessibility	The accessibility of community facilities for the elderly, including barrier-free facilities.	1 ... 2 ... 3 ... 4 ... 5

## Appendix III Questionnaire on “Preferences of Users of Community Public Space”

### Questionnaire on “Evaluation of Community Public Space - User Preferences”

Hello! I am a master's degree student of architecture at South China University of Technology, this questionnaire is for the master's thesis research content, does not involve any commercial behavior, filled out anonymously, does not involve any personal private information, please feel free to fill out. Your valuable opinions are very important to the overall construction of public space for the elderly in Dual-aged communities in Guangzhou, and I would like to thank you very much for your help by taking out your valuable time from your busy schedule!

Please check the circle “ ” in front of the corresponding option and fill in the matching answer on the horizontal line Estimated time:10 minutes.

**1. The length of time you have lived in the Stone Heights neighborhood:**

- ☐ More than 40 years   ☐ 20-40 years   ☐ 10—20 years   ☐ 5—10 年 years   ☐ 1—5 years  
☐ Just moved in

**2. In which of the following public spaces do you usually conduct your activities (check more than one):**

- ☐ Vacant plaza within the community   ☐ Public open space between residential buildings   ☐ Community Corner Public Open Space   ☐ Open space on the street   ☐ Entrance plaza   ☐ Green space   ☐ Open space in front of residential building   ☐ Street level   ☐ Ground floor overhead space   ☐ Other (please give examples)

**3. What activities do you typically do in the public spaces of your community (multiple choices allowed):**

- ☐ Walking/jogging   ☐ Physical exercise   ☐ Social activities   ☐ Reading/Meditation  
☐ Recreational activities (chess, etc.)   ☐ Recreational activities (opera, musical instruments, dance, etc.)   ☐ Landscape maintenance (flower planting, etc.)   ☐ Children's activities (accompanying grandchildren, etc.)   ☐ Recreational activities (physical rehabilitation, etc.)  
☐ Organized thematic activities (community care, lectures, medical care, etc.)   ☐ Other (please give examples)

**4. The reason you chose these places is (multiple choices allowed):**

- ☐ High space quality   ☐ Spacious   ☐ Easy access   ☐ Highly used   ☐ Various and lively activities   ☐ Better environment   ☐ Quiet   ☐ Less interference with use   ☐ Long serviceable time   ☐ Space with character   ☐ Sun-drenched   ☐ Shelter from the wind and

rain

**5. How often you conduct activities in public spaces:**

☐ More than twice a day   ☐ Basically every day   ☐ 3-4 times per week   ☐ 1-2 times per week   ☐ Not necessarily

**6. The average number of hours per day you spend doing activities in public spaces (including activities of daily living, such as walking, etc.):**

☐ 30 minutes or less   ☐ 30 minutes - 1 hour   ☐ 1 hour - 2 hours   ☐ 2 hours - 4 hours  
☐ More than 4 hours

**7. How satisfied are you with the overall public space in your community:**

☐ Very satisfied   ☐ Relatively satisfied   ☐ Generally satisfied   ☐ unsatisfied   ☐ Very dissatisfied

**8. What do you think are the main areas for improvement in the public spaces of the community:**

☐ Physical space (infrastructure, etc.)   ☐ Spatial environment (greening, landscape facilities, etc.)   ☐ Cultural activity   ☐ Ageing-friendly facilities   ☐ Management model and service content

**9. What are your basic expectations for the future renewal and transformation of public spaces in your community:**

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At the end of the article, I put my pen to paper, and my thoughts are mixed. Always think that the future is long, but I do not know that time is in a hurry, more than twenty years of schooling experience, are condensed into valuable memories. Even though I have a lot of reluctance, I am still grateful.

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cities, communities and people is never-ending. I would like to use this research as a starting point to continue to explore more possibilities of urban design and renewal.

Where of what's past is prologue.