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Research on Renewal Design of Public Spaces in Old Communities——Taking Baiyunyuan Residential Area in Nanjing as an Example

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Title of the report Research on the reconstruction design of historical and cultural blocks under the theory of urban acupuncture and moxibustion - A case study of the historical and cultural blocks in the south of Gaoyou City Student ID S24101357031 Name: Liang Xinyue

ABSTRACT

In contemporary times, China has entered an ecological civilization, and the demand for a better living environment is increasing. However, there are some issues faced by old residential neighborhoods, including pollution, lack of amenities, disconnected public spaces, and loss of culture. Based on this situation, this paper analyzes the case of Baiyunyuan Community in Nanjing, focusing on how to renew the public spaces in the neighborhood, where the community service center will serve as the key place for designing. In practice, a holistic strategy for renewal is proposed, turning the administration office into a multi-purpose public space.

The study identifies six problems through literature review, field research, and comparative analysis of cases as follows: old building materials, old infrastructures, insufficient emergency capacity, disorderly traffic, boring ecological landscape, and lack of cultural ambience.

On the basis of the above diagnosis, the proposed concept makes use of the theme of "Urban Restoration." The center is structured to have four different zones: the administrative services zone, the public services zone, the cultural exhibitions zone, and the emergency zone. In the case of the administrative counter, the concept of "open service island" is applied, with moveable partitions used to facilitate multiple functions. The program elements include the shared reading room, playroom for children, elder care home, and conference hall. In the case of the emergency zone, the theme of "Peace-time services and emergency conversion" allows rapid transformation into the community command center and community shelter.

What is distinctive about this strategy is that this renewal strategy takes into account the use of double urban renewal theories to renovate the ecology, function,

culture, and human being. It also takes into account the inclusion of the local cultural heritage to prevent any homogenization process. The result of such an approach will be a working renewal strategy for the community service center in Baiyunyuan.
Keywords: old residential communities; public space renewal; urban mending; community service center;

INTRODUCTION

Research Background

With the increase in size of the city and continued evolution in its model of development, renewal of the old residential areas has emerged as an integral part of efforts made to enhance the quality of living of people as well as maintain sustainable development within the city[1]. In China, there have been several policies adopted through time that emphasize on this very issue–from the basic improvement in environmental conditions to adopting an integrated approach to renewal with emphasis on residents' needs[2]. The focus is on issues such as infrastructure enhancement, optimization of public services, improvement in community management and development of livable communities[3]. In this regard, the city of Nanjing has been making sincere efforts for the renewal of its old communities.

However, during the era when such communities were initially planned, there was a deficiency in the planning theory, construction needs and technological circumstances, and the effect of such can be clearly seen now: inadequate space, deteriorating infrastructure[4], disjointed spatial arrangement, and obsolete service functions. As the residents' living standards increase and the population structure changes, their demand for community spaces is no longer only about ease of access; instead, they need higher quality spaces that allow socializing, culture and art activities[5], care for seniors and children, and community development. Therefore, the traditional community service centers, most of which are filled with administrative tasks, do not fulfill these demands[6][7].

As illustrated through the example of the Baiyunyuan community of Nanjing, there is a need to renovate the current public spaces due to their poor condition, disorganization, lack of sufficient activity spaces, and low community vitality[8]. As an essential element in the process of interaction within the community, the community service activity center needs to move away from its role as an administrative office to act as the "living room" of the community through which

resident interaction can take place[9][10]. The process of renewal of the public space around the community service activity center will contribute significantly to the debate on public space regeneration[11].

The Object of the research the public space renewal design of old residential communities.

The Subject of the research is the design methods and strategies for the community service center as a core public space carrier in Baiyunyuan Community.

The structure of the work consists of an introduction, four chapters, a conclusion, references, and an appendix.

The introduction has problems such as aging facilities, insufficient public space, scattered space layout, lagging service functions and lack of cultural atmosphere in the old residential areas of Chinese cities. The needs of residents have shifted from basic convenience to high-quality spaces such as social interaction, cultural activities, elderly care and children's activities. Traditional community service centers mainly focus on administrative functions, which makes it difficult to meet these needs. This study takes Nanjing Baiyun Garden Community as an example, takes the community service center as the core public space carrier, and transforms it from an administrative office space to a community "living room". The research object is the updated design of public spaces in old residential areas, and the research theme is the design methods and strategies of Baiyun Garden Community Service Center. The introduction also covers research objectives, methods, scientific innovation, and theoretical and practical significance.

The first section analyzes the first and second chapters, that is, research overview and basic research. The study of the renewal of old communities in China has shifted from simply improving the physical environment to focusing on sustainability, humanistic care and governance orientation, emphasizing organic renewal, micro-renewal, community construction, resident participation, social

capital, aging and child-friendly development. Foreign research shifts from material regeneration to neighborhood renewal and social sustainability, focusing on participation, empowerment, mixed use, environmental behavior, place creation and integrated community centers. Specific cases include: the micro-renewal project of 36 square meters of idle space in Community No. 20, Changying Village, Nanjing, with an investment of about 30,000 yuan. After a questionnaire survey of 168 families and 142 suggestions, the transformation was completed within four months, forming a cultural display, tool sharing, discussion and consultation area; Shanghai Bosiyou "New Space" Independently designed by residents and transformed old things; Tianjin "Mr. Li's car repair" retains the daily informal space and realizes visual empowerment through public art. The second chapter defines the concept of "old community", explains its four development stages and main characteristics, and proposes that the renewal of public space should focus on functional optimization and space integration, idle space activation, barrier-free design and aging design.

The second section corresponding to Chapters 3 and 4, that is, updating principles, strategies and design practices. Chapter 3 puts forward four principles: overall coordination, gradual renewal, environmental continuity and ecological sustainability; five strategies: functional restoration, spatial activation, cultural inheritance, ecological restoration, and activation of surrounding areas through community service centers. Chapter 4 takes Baiyun Garden Community as an example for practice: the layout of "one core, two axes and multiple nodes" is adopted internally, and eight functional areas are set up, including comprehensive services, entrance reception, cultural display, reading and learning, multi-functional activities, children's activities, elderly activities and neighborhood interaction; at the same time, the entrance space and central square are designed. , neighborhood interaction space, children's activity space, elderly activity space and internal public space of the service center. Specifically, it includes open service desks, flexible partitions, shared reading areas, children's activity spaces, elderly daycare centers, community memory display areas and sponge facilities, etc.,

realizing the transformation from a single administrative space to a multifunctional community public space.

The conclusions indicate that:The renewal of old communities should shift from material improvement to people-oriented, sustainable and governance-oriented methods; emphasize small-scale, low-cost, progressive and targeted interventions; adaptive aging transformation should pay attention to the physiological, psychological and behavioral needs of the elderly. Case studies show that it is important to clarify needs, residents' participation, campus collaboration, cost control and retain daily informal space. The Baiyun Garden community should follow the principles of overall coordination, gradual renewal, continuation of environmental context and ecological sustainability, and transform the community service activity center into the core of community public life through functional restoration, spatial activation, cultural inheritance, ecological restoration and central node radiation.

Based on the research content and research results of this topic, the author has written this master's thesis. The theory this paper not only has theoretical innovation, but also has practical application value, which can be used by professionals in various professional fields provide systematic guidance for the renovation and design of old community public space in practice.

CHAPTER I. REVIEW OF THE CURRENT STATUS OF RESEARCH IN CHINA AND ABROAD

1.1.Old community research

1.1.1.Current research status in China

The academic research done regarding the rejuvenation of aged cities is set against the backdrop of urban renewal and redevelopment of historic areas. As the evolution of the literature shows, it has moved from the mere physical improvements to sustainable development and good governance within the community[12]. In the beginning, the literature was mainly concerned about the physical improvements and was focused on the physical improvement of buildings, infrastructure, housing, and facilities[13][14]. These physical improvements were concerned with problems like aging pipes, poor transportation system, poor landscaping, poor lighting, and poor building facades. Although these improvements brought tangible benefits, they used a top-down approach which often neglected the needs of people, community relations, culture, and operation mechanisms[15].

Since the emergence of such ideas as organic renewal, micro-renewal, and community building, research paradigms have been shifting to a slower, smaller scale, and people-oriented approach. The idea of organic renewal puts emphasis on the preservation of the existing urban structure without demolishing and reconstructing large areas, micro-renewal implies a low-cost and low-impact strategy combined with the involvement of the residents, while community building stresses collective identity, engagement of the people, and community management. Therefore, the renewal of aged urban communities has changed into a complex process that not only includes spatial improvement but also involves social interaction, cultural heritage, economic growth, and governance[16][17]. Current studies focus mostly on the people's satisfaction, local identity, social networks, needs of the vulnerable populations, and sustainability of renewal projects[18].

In recent years, policies at the national level to renovate old urban housing neighborhoods have brought about scholarly interest in topics including improvement of public space quality, inclusive design for old age people, child-friendly design of neighborhoods, improvement of facilities provided by community services and governance issues[19]. Empirical and theoretical analysis has increasingly moved away from "what to renovate" to "how renovation should be conducted, who should be involved, and how it could be sustained." Community life circle, complete community and 15-minute life circle are some of the theoretical concepts that have been considered crucial in understanding these topics[20]. Studies focusing on aging friendly environment focus on issues of access, safety, barrier free facilities, elderly care services and places for socializing, whereas those focusing on child-friendly environment emphasize issues of activity space, nature and interaction between parent and children.

For example, concerning public space renewal, most of the previous studies considered spatial vitality, behavior, evaluation methods, and optimization techniques[21]. With regard to the methods used in the studies there were behavioral observations, surveys, spatial syntax, and spatial data analysis. These methods are applied in finding out the relation between spatial components and people's activities. For example, safety, comfort, accessibility, diversity, and cultural identity could be considered as part of the evaluation methods[22]. It is important to note that most of the studies consider outdoor spaces or landscape environment, but not the interior spaces.

Concerning the research on the community facilities, the main issues are the functional composition, accessibility, facilities for the elderly, and equal availability of the public services[23]. According to the current literature, community service centers have to evolve from administrative centers into multifunctional public facilities including the following aspects: culture, senior care, childcare, socialization, and utility services. Activity centers of the community services could be considered as key centers in the community, able to serve as community living rooms, cultural centers, discussion centers, and

emergency centers. However, at present the major focus of the studies is on the internal functions and services of facilities with relatively little attention to the integrated renovation of the external spaces including entrances, squares, courtyards, corridors, green zones, and walkways[24].

The existing literature has provided valuable theoretical and practical basis for revitalizing old communities. However, there still lacks systematic studies on the integrated design of activity centers and the surrounding public spaces for community services. Limitations of existing studies include: (1) the disconnection of public space studies from the studies on optimization of facilities, (2) lack of behavioral design in the design process, (3) little attention paid to community service centers as spatial triggers, and (4) insufficient attention given to participation of residents and operations. Future studies, therefore, need to formulate an integrated approach that combines demand analysis, function design, spatial design, and governance mechanism, which will provide systematic theoretical guidance and practical approaches for public space revitalization in aging communities[25][26].

1.1.2. Current Status of Foreign Research

The development and study of the processes of revitalization of historical cities across the world have not only changed in terms of content but also the period of their existence has changed. Thus, they have gradually moved from physical regeneration to neighborhood regeneration and social sustainability[27]. From the 1970s, there were several regeneration programs in many European countries which were used in order to solve the problem of deterioration of the physical environment, the problems associated with ecology and social problems connected with the aging residential neighborhoods. Neighborhood regeneration in this case was done through the collaboration of governance in which many actors such as government institutions, communities and others participate. They were focused on such aspects as the reconstruction of buildings, restoration of the environment, development of public services, transportation, energy efficiency, etc[28]. However, in the other countries such as the United States, Canada, and

Australia, there are completely different approaches to the process of regeneration. In this regard, HOPE VI program in the US was aimed at regeneration of dilapidated housing through housing regeneration and provision of better community services; in Canada, people with low income are provided with rental subsidies; in Australia, the principles of green building were introduced for better environmental sustainability of aging residential neighborhoods. With the beginning of the late twentieth century, the focus of community renewal in Western nations is changing to participation, empowerment and mixed-use development[29][30][31].

From a theoretical perspective, some of the foreign scholars have also conducted researches on community renewal in relation to social structure, community development, environmental behavior, and inclusive design. Early theoretical approaches to communities emphasized the significance of communities as basic social entities and relationship between community development and social development[32]. Further researches on the concept have highlighted the role of social capital, community identity and participation of residents in order to sustainably renew communities[33]. So, from the perspective of scholars, community renewal should not be limited to physical renewal of environment, but also social relationships and culture and development of managerial practices in the future. That is why the concept of old community renewal has shifted from engineering concept to comprehensive concept.

In terms of public space research from the international perspective, the major issues include vitality of community, spatial quality, social interactions, transport environment, adaptation of aging people, and public participation. Most scholars consider public space as an important communication medium for social activities. Research about spatial vitality suggests that well-designed spatial elements like seating arrangements, landscaping, accessibility, and flexible activity areas can foster the staying behavior of residents and facilitate community interactions[34]. Furthermore, according to research using the framework of environmental behavior theory and place-making theory, public space needs to ensure safety,

comfort, diversity, accessibility, and sense of belonging for its users. Additionally, community transport research suggests the significance of designing pedestrian-friendly spaces, connectivity, and low carbon mobility as crucial aspects of good-quality public space[35]. Social capital research shows that networks of residents and their cooperation are crucial for the successful execution and sustainability of any project for renewal.

In the context of increasing population aging worldwide, community renewal suitable for the elderly has been an emerging area of research as well. International literature has considered how the provision of healthy environments for elderly inhabitants through public space design such as barrier-free design, resting areas, accessible transport system, and community elderly services would be beneficial to their health and independent living as well as their participation in society. At the same time, participation of residents has already been acknowledged as a critical element of sustainable renewal[36].

Research on community centers further shows that the development of these facilities has transformed them from just providing services to becoming comprehensive community centers that incorporate culture, elderly service, child care service, communication, and public services[37]. From the international perspective, community centers and their related public spaces should be designed in such a way as to be accessible and flexible so that people of all ages can benefit from them. However, current research seems to address either the design of public spaces or functional optimization of the community facilities without much consideration of the relation between the two[38]. The above-mentioned international theories and practical experiences can serve as an important guide in exploring integrated renewal design of community service centers.

1.2. Research related to the renovation design of old communities

1.2.1.Minor Updates and Reconstruction of Public Spaces

Micro-renewal has become one of the most active research directions in old community reconstruction design in recent years. Researchers at home have summarized the relevant achievements of the last decade and classified the

research into such areas as the classification and renewal of old community space types and the community consultation and co-construction model of multi-subject coordination[39]. In terms of theoretical connotation, micro-renewal advocates small-scale, step-by-step and economically viable interventions and stresses residents' participation and social capital formation. There are studies which propose five strategies for the reconstruction of public space in old communities through micro-renewal, including reconstruction of participation mode, multiplicity of functions, space design, context of memory and community relations; In the practice field, some researchers manage to conduct comprehensive management by expanding space types, improving space facilities, constructing green landscape and reconstructing community space through the principles of micro-progressiveness, demand orientation and economic practicality, demonstrating that micro-renewal plays an important part in the rejuvenation of old communities[40].

The theory of urban acupuncture and moxibustion has now grown to become a substantial theory through which the process of incremental urban renewal can be carried out. This is evident from the research paper dealing with the redevelopment strategy of the old residential area within the Jinan Fenghui Community[41]. Moreover, there is also another research paper which highlights the requirement of reassessing the spatial structure, balance of functions, and aesthetics, proper planning of parking lot, preservation of the landscape resources of greenery, activating the gray spaces in the community, and nurturing a distinctive culture atmosphere in order to rejuvenate the public space within the aging communities[42].

Micro-updating has attracted much attention in the international literature. There has been systematic review of the concept and principles of micro-updating; analysis of the factors affecting public space reconstruction in old communities; and description of the redevelopment strategy with accompanying examples. From these studies, we can see a trend from renewal of community public space in terms

of material space to community protection, heritage conservation, and improvement of the environment[43].

1.2.2.Research on Age-Friendly Renovation

With the progression of aging becoming increasingly obvious, adaptive aging renovations have emerged as a popular subject that cannot be ignored by the old community design research any more. Following the principle of human-environment adaptation, some research starts from the psychological, physiological, and behavioral requirements of the elderly and conducts the study from three angles: community site planning, space environment construction, and service facilities configuration, aiming to grasp the degree of adaptation between the supply of environment and the actual demands of the elderly[44]. From the perspective of living circle, however, some research pays attention to the deficiencies of urban old residential communities in terms of narrow streets, lack of public activity space, aged municipal facilities, and barrier-free facilities, as well as poor community coherence[45]. While some research takes the daily travel demand of the elderly into consideration, analyzing the kinds and features of elderly behaviors by choosing the Harbin Shipyard Community as a sample community and putting forward a strategy of constructing an adaptive aging community walking system accordingly. Based on the domestic research, Xu Bin studies the adaptive aging renovation of urban old residential communities in three cases: public space, public facilities, and residential buildings, and makes a relatively systematic analysis of the needs and countermeasures of adaptive aging renovation[46]. Generally speaking, these researches approach the problem from various perspectives of theory and space scale, enriching the research framework of adaptive aging renovation of old communities and offering various references for future renovation designs.

1.3.Thematic research on the renovation project of public spaces in old communities

1.3.1.No. 20 Community, Changying Village, Nanjing

No. 20 Building of Changying Village is a typical old residential area, home mostly to former employees of state-owned enterprises like the railway company. The elderly make up a large share of the population, and they strongly want places to socialize and take part in activities. The problem is, the community has long lacked public activity spaces that are actually safe and usable. There is a 36-square-meter public activity room, but the paint is peeling off the walls, the electrical circuits are aging, and water leaks in whenever it rains — so it has sat idle for years. Residents walk past and shake their heads: it's not that the space doesn't exist, it's that it simply can't be used.

In contrast to the conventional practice of demolition and rebuilding, the renovation adopted the "micro-renewal" approach. With an investment of about 30,000 yuan, the team was able to save about 30% through resource recycling and sharing. Before implementing the renewal, the team conducted an on-line and off-line questionnaire survey among 168 households, collecting 142 effective suggestions, which was eventually summarized into three keywords: functional zoning, safety assurance, and convenient service. Accordingly, the space was partitioned into cultural display zone, tool share zone, and deliberation and consultation zone, equipped with sewing machines, shared cabinet for tools, and combinable tables and chairs. In the construction process, there were 13 representative residents supervising and participating in providing 26 suggestions, among which 21 have been adopted and implemented. Furthermore, in cooperation with the School of Urban and Planning Design of Nanjing University, Nanjing Special Education Normal University and volunteers' organizations, the community formed a "school-community cooperation and multi-party association" pattern. Overall, it took four months to complete, with 15 family visits and six residents' consultations.

The key objective of this case lies in implementing a functional re-engineering of the current space, which should be achieved through a very strict budget constraint. In the meanwhile, it also embodies the philosophy of “coexistence of green and old” in the activity system of the elderly and younger

members. After the activation of the space, there were six activities on different topics such as handicrafts, health-preserving seminars, green plant activity, and so forth, altogether involving more than 180 participants, including elderly members reaching 65%. In terms of research, this case presents us with three themes: the mechanism for pinpointing residents' needs,the process of utilizing professional resources from universities in community management, and cost control.

1.3.2.The "Zhiyin 'XIN Space'" in the Zhiyin Community, Shanghai

Zhiyin Community is located in Xinhua Road Subdistrict, Changning District, Shanghai. For a long time, the area around the pump house was a “forgotten corner”: clutter was piled up, the passageway was narrow and messy, and discarded furniture was dumped casually. Unlike the usual renovations led by the government or professional institutions, this project was initiated by the residents themselves.

From the very beginning, the project invited experienced residents in the community to serve as “designers.” Gardening enthusiasts and carpentry enthusiasts all took part. Among them, Uncle Yuan, whom residents called the “hexagonal warrior” (a Chinese internet term for an all-rounder), put forward many concrete suggestions: rainwater collection barrels were painted and decorated with patterns, becoming landscape features; a second-hand tool cabinet that had been picked up was repainted and refurbished, turning into storage space for the “Zhiyin Repair Shop”; and discarded wooden boards were not wasted either—they were turned into the signboard for the repair shop, painted together by volunteers. After the renovation, the originally messy corners are now equipped with sunshades and leisure tables and chairs, which have become a rest area where residents can sit down and rest; the originally narrow passage has also been transformed into a green landscape belt; as for the place where abandoned furniture was dumped in the past, it has been transformed into a beautiful and practical maintenance space. In fact, the research value of the case is not the scale of the space, but whether the identity of the participants has changed. Residents are no longer just "objects to be renovated" passively waiting to be renovated. They are familiar with the

community environment and have accumulated daily experience, so they can often become the actual leaders of design decisions. Researchers can continue to ask from several angles: how is the design ability of non-professional participants activated? What role does the type of knowledge mastered by community experts and enthusiasts play in space renewal? What conditions do self-organized initiatives need to meet if they want to develop sustainably? In addition, Uncle Yuan also invited a community photography enthusiast to shoot a short video to record the rebirth process of space. This raises another problem: community narrative and spatial identity are actually mutually constituted.

1.3.3.Tianjin "Uncle Li repairs cars in the garden" convenient service corner

The case of Tianjin points out a problem that most conventional renovation projects often ignore: a small car repair shop run by a 76-year-old local who has been in operation for 35 years. When routine renovations of old residential areas, such informal commercial spaces are almost always "cleaned up and closed", and the community memories and daily service functions connected to them are also easily erased. The designer did not demolish or move the repair booth, but focused on the original three-wheeled cart, and customized an exclusive painting scheme for the car. On the one hand, the practical functions of tool storage and actual maintenance operation are retained; on the other hand, this small personal workspace has also been cleverly integrated into the overall visual system of the block, forming a "convenient service corner with both function and aesthetics" with the painted hollow landscape wall. Simply put, this kind of artistic intervention has not changed the core use of the space - this repair shop is still a repair shop, and the work done is exactly the same as before.Instead, by recoding its visual language, it grants this long-overlooked gray-area everyday space new public visibility and legitimacy.

This case brings a valuable critical perspective to public space renovation in old communities: renewal doesn’t have to mean replacing or upgrading functions. It can just as readily be about honoring the everyday practices already there and

giving them visual empowerment. Researchers can build out themes like “the formalization strategy of informal spaces,” “the role of public art in community renewal — decoration or empowerment,” and “how the continuity of daily life serves as a dimension of renewal evaluation.” Compared to the two earlier cases, this approach strikes a more critical tone, making it well suited for digging into deeper questions at the heart of old community reconstruction: “whose space,” “whose aesthetics,” and “whose standards.”

Conclusions to the first chapter

1.Domestic and international research on old community renewal has shifted from physical improvement to sustainable, people-oriented and governance-oriented renewal, with increasing attention to residents’ participation, social capital, local identity and vulnerable groups.

2.Micro-renewal and “urban acupuncture” are key strategies, advocating small-scale, low-cost, incremental and targeted interventions; age-friendly renovation further focuses on the elderly’s physiological, psychological and behavioral needs.

3.The case of Nanjing Changying Village has realized the micro-renewal of the idle 36-square-meter room through residents' survey, multi-party cooperation and low-cost transformation, highlighting the importance of demand identification, campus cooperation and cost control.

4.The case of Shanghai Zhiyin's "new space" shows that residents have changed from passive objects to active designers, which has sparked discussions on topics such as non-professional design ability, community knowledge and self-organization.

5.The case of "Uncle Li repairing cars in the garden" in Tianjin shows that updating can retain rather than replace daily informal practices, empower car repair stalls through public art, and trigger deep thinking about space, aesthetics and continuity of daily life.

CHAPTER 2

Basic Research on the Design of Public Spaces in Old Communities

2.1.Overview of an Old Neighborhood

2.1.1.The concept of an old community

The old city is the core component of the existing living space of the city. It usually refers to the centralized residential areas built in the 1980s, 1990s or even earlier. Due to the limitations of the level of economic development, planning concept and construction technical standards during the construction period, the initial building standards of these communities were generally low[47]. After decades of use and wear, they generally have problems such as aging infrastructure, insufficient public facilities and poor quality of the living environment. However, the overall structural safety of the building is still in good condition and has a high use value, while having the potential to be updated and improved[48].

The formation of older communities is the result of multiple factors accumulating over time: After the housing system transitioned from welfare housing to commercialization, the unified operation mode of the original units gradually disintegrated, and the connection between market-based property management and community operation mechanisms was not smooth, resulting in a lack of systematic maintenance of facilities over a long period; Urban planning and construction standards continued to be upgraded and updated, and the parking ratio, pipeline capacity, and public service indicators of the older communities at the time of construction were no longer suitable for modern living needs; A large number of communities derived from unit-style courtyards underwent functional transformation, and the original logistical service functions gradually separated, and the grassroots public service system failed to fully take over; In addition, insufficient special maintenance funds and the absence of property management further exacerbated the decline in spatial quality[49][50].

It is important to note that older communities are not the same as "dangerous and dilapidated houses". Dangerous and dilapidated houses specifically refer to buildings that have major safety hazards in the main structure of the building and

do not meet the living safety standards. The core contradictions of old communities are lagging functions, aging facilities and insufficient service supply. Its spatial layout is basically complete[51]. At the same time, it carries the long-term neighborhood social network, collective life memory and regional cultural genes. It is an urban land space with both use value, social value and cultural value.

From the perspective of spatial composition, the old community is a complex spatial system, which not only includes major residential buildings, but also includes a variety of spatial elements such as internal roads, public green spaces, activity squares, parking lots and community service facilities[52]. From the perspective of social attributes, old communities usually have a high degree of aging, close neighborhood social relations and deep local cultural accumulation.Therefore, the renewal of older communities cannot be limited to the physical environment renovation alone; it needs to take into account the improvement of spatial quality and the maintenance of social relations, achieving the coordinated advancement of material renewal and cultural inheritance[53].

2.1.2.The development history of an old community

The development and evolution of old communities in our country can generally be divided into four stages: formation, stability, aging, and renewal. The development trajectory of these communities is highly consistent with the changes in China's housing system and urbanization process[54].

The formation stage mainly occurred from the 1950s to the 1980s. Most communities were built based on unit-based compounds or old urban residential areas, and they were the products of the welfare housing distribution system during the planned economy period[55]. During this stage, community construction focused on meeting basic housing needs, with compact residential layouts and many public service facilities attached to the unit logistics system. The layout was relatively concentrated but the construction standards were relatively low, and the overall function was relatively simple[56].

The stable stage roughly lasted from the late 1980s to the mid-1990s. Housing system reform gradually advanced, and housing property rights began to diversify.

However, the overall structure of the community's residents remained stable, and the social relationships among neighbors were mature and close. Community public services gradually transitioned from the unit logistics system to socialization, and a basic grassroots living support system covering daily needs was gradually formed[57].

The aging stage began after the comprehensive housing commodityization reform was fully launched in the late 1990s. With the rapid outward expansion of cities, a large number of new commercial residential buildings emerged, and the young population in old communities continued to move out. The aging characteristics of the population became increasingly prominent. At the same time, the original facilities gradually aged and deteriorated, and the maintenance guarantee mechanism was absent. The problems of material environment decline and lagging public services became increasingly prominent, and community development gradually stagnated[58].

The renewal stage was gradually initiated in the early 21st century. At the national level, the renovation and urban renewal work of old communities was gradually promoted. In the early stage, it mainly focused on infrastructure repair and comprehensive environmental improvement[59]. In recent years, as urban renewal has fully entered the stage of upgrading existing resources, the renewal concept has shifted from a single environmental improvement to a comprehensive renewal model that promotes functional improvement, service enhancement, cultural inheritance, and community governance in a coordinated manner[60].

2.1.3.The main characteristics of an old community

Old communities have the following characteristics: Firstly, they have a high density of space with limited public areas; Secondly, the facilities are old, and problems such as pipelines, roads, lighting and accessibility are prominent; Thirdly, there is a significant aging population, and there is a strong demand for elderly services; Fourthly, the neighborhood relationships are relatively stable, and the community has rich memories; Fifthly, the location conditions vary greatly, with some being located in the city center, where the land value is high but the

renovation is difficult; Sixthly, the governance entities are diverse, and the residents' demands are complex[61][62].

2.2. The content and methods of the renovation design for public spaces in old communities

2.2.1.Functionality enhancement and space integration

In old communities, there is a common problem of insufficient total public space and scattered layout. Enhancing the utilization efficiency of space through functional integration is the core path for the renewal of existing buildings. As a core public building, the community service center can integrate a variety of functions such as government service hall, reading room, chess and card game room, fitness and health care, children's play area, day care for the elderly and multi-function hall to provide one-stop public services and avoid waste of resources caused by space dispersion[63]. The external public square can undertake the functions of residents' morning exercise, group gathering, cultural exhibition, convenience market and daily leisure in turn through time sharing and scene switching, so as to meet the diversified use needs in a limited space and maximize the comprehensive value of the existing space[64].

2.2.2. Activation and Utilization of Existing Space

In view of the current shortage of public space resources in the old city, it is necessary to make full use of the existing idle space around the community service activity center, including the open space behind the building, street corners and edge areas, building roofs, ground elevation areas and underutilized parking spaces. Through micro-update measures such as re-dividing functions, setting up flexible green enclosures, installing leisure furniture, and improving night lighting, these scattered spaces can be transformed into neighborhood interaction nodes, daily leisure places and small activity venues, effectively activating existing space resources[65].

2.2.3. Accessibility and Age-Friendly Design

The renovation of public spaces in old communities should adhere to the design concept of full-age inclusiveness, and establish an accessible and

age-appropriate system covering all scenarios. The accessibility design should comprehensively cover the building entrances, passageways, stairways and ramps, public restrooms, elevators, and outdoor activity areas, forming a continuous closed-loop accessibility system. The elderly-friendly design should focus on configuring anti-slip flooring, continuous handrails, rest seats, clear signs, adequate lighting and shading facilities, fully matching the daily usage needs of the elderly. The children's activity space should strengthen safety protection design, ensuring transparent supervision views, reasonably dividing age-specific activity zones, and balancing safety and fun[66][67].

Conclusions to the second chapter

1.Old communities are concentrated residential areas built mainly in the 1980s, 1990s or earlier. They are not the same as dangerous or dilapidated houses: their core problems are functional lag, aging facilities and insufficient service supply, while they still retain usability as well as social and cultural value.

2.Their development generally goes through four stages: formation, stability, aging and renewal, closely related to China′s housing system reform and urbanisation process.

3.Their main characteristics include limited public space, aging facilities, a high proportion of elderly residents, relatively stable neighbourhood relations, rich community memory, and large differences in location conditions.

4.Public space renewal in old communities should focus on functional integration, activation and utilisation of existing idle or fragmented spaces, and accessibility and age-friendly design, so as to improve spatial quality while maintaining social relations and cultural continuity.

5.This chapter provides the theoretical basis for the later investigation, demand analysis and renewal design of the public space of Baiyun Garden Community Service Activity Center.

CHAPTER 3

Principles and Strategies for Updating Public Spaces in Old Communities

3.1.Design principles

3.1.1.The principle of overall coordination

The renovation of public spaces in old communities is a comprehensive project involving physical space, social relations, public services, and community governance. It should follow the principle of overall coordination. The principle of overall coordination requires treating the community service activity center and its surrounding public spaces as an integrated whole rather than isolated buildings or outdoor areas. In the spatial dimension, the relationships between indoor and outdoor, above-ground and underground, buildings and landscapes should be coordinated to form a continuous public space system. In the functional dimension, various functions such as public services, cultural entertainment, sports fitness, elderly care and child care, and convenient commercial services should be coordinated to avoid fragmentation of functions and spatial isolation. In the temporal dimension, both near-term renovation and long-term operation should be considered to ensure the sustainability of the renovation results[68].

As the core node of community public life, the transformation of the community service activity center of Baiyun Garden Community should be considered in the context of the public space system of the whole community. The entrance square of the center, the green belt between the residences, the pedestrian walkway and the sunshine square should be connected to each other to form a public space structure of "center-led and multi-point linkage". At the same time, the transformation design needs to be coordinated with the overall style, population structure and cultural activities of the Baiyun Garden community to avoid the design being out of touch with the actual situation of the community.

3.1.2.Principle of Progressive Updates

The principle of gradual renewal emphasizes the continuous improvement of space quality through minimal intervention, avoiding large-scale demolition and expensive renovation projects[69]. The renewal of public spaces in old communities

is limited by space conditions, funds and the continuity of residents' lives, so a small-scale, phased and adjustable renewal method should be adopted. Progressive update does not reduce the design standard, but achieves "small investment, large benefits" through accurate problem diagnosis and meticulous space design.

The "Changxing Square" project at No. 20 Changxing Village, Qixia District, Nanjing is a typical example of gradual renewal. The area of the project is only 36 square meters, with a total investment of about 30,000 yuan. By reusing old things and exchanging resources, about 30% of the cost has been saved. The renovation was completed within 4 months, and now it has become the most active "public living room" in the community[70]. This case shows that under limited conditions, progressive updates can effectively activate community public space. The upgrading and transformation of the Baiyun Garden Community Service Center should also follow the principle of gradual renewal, give priority to solving the most strong problems reflected by residents, such as damage to the entrance square paving, insufficient rest facilities and imperfect barrier-free access, etc., and gradually improve the quality of space through phased implementation.

3.1.3.Principle of Continuity of Context

The principle of continuity of context requires that the renewal of community public spaces should respect the historical context and cultural memory of the community, and integrate regional cultural elements into the spatial design. Old communities, during their long-term use, have formed unique community culture and neighborhood relationships, which are intangible cultural assets and an important source of community identity and belonging. The renewal design should not sever the historical continuity of the community, but should achieve the continuation and regeneration of community culture through spatial narration, symbol translation, activity implantation, etc. The practice of renewal in the Xiaoxishui area of Nanjing provides valuable experience in the principle of continuity of context. This area established the principle of "respecting the original residents and preserving the traditional culture of the neighborhood", creating a symbiotic model of "intangible cultural heritage + life", introducing master studios

of Fang Jianchen, Fuzhou intangible cultural heritage experience centers，etc.，adding a rich cultural flavor to the old streets and alleys. Baiyunyuan Community has various sports and fitness teams such as waist drum，Mulan，Tai Chi，singing，fashion， and table tennis， with rich community cultural vitality. The renewal design should transform these cultural vitality into elements of spatial design，such as setting community culture display walls， multi-functional activity spaces，community memory corners，etc.making the community service activity center a material carrier of community culture[71].

3.1.4.Ecological sustainability principle

The ecological sustainability principle requires that the renewal of community public spaces should focus on ecological environment protection, resource conservation and low-carbon development. Although the greening rate of old communities has a certain foundation, there are widespread problems such as single plant configuration, insufficient maintenance and management, and low ecological benefits[72]. The renewal design should enhance the ecological quality and sustainability of community public spaces by increasing shade provided by trees, enriching plant layers, building sponge facilities, and utilizing renewable resources, etc.

The urban renewal action plan of Nanjing City clearly states that it is necessary to improve the livability, resilience and intelligence of the city, and promote the optimization of urban spatial structure, improvement of functional layout, and restoration of the ecosystem. The greening rate of Baiyun Garden Community is 35%, which is higher than the regional average of 28%. It has a relatively good ecological background. The green space around the community service activity center should be oriented towards ecological sustainability, increase native plants and nectar plants, set up rain gardens and permeable paving, and integrate the green landscape with the resident activity space to achieve a balance between ecological benefits and usage functions[73].

3.2.Design strategy

3.2.1. Functional repair strategy: Improve the community public service system

The core of the functional repair strategy lies in improving the public service system of the community service activity center through functional integration and spatial reorganization, transforming it from a single administrative service space into a comprehensive public service and public interaction space.

First, the transformation of service space into an open one. Remove the traditional service counters and adopt a "side-by-side" service model. Design the service hall as an open and family-like layout. Add furniture such as sofas, coffee tables, plants, and book and newspaper racks to create a warm atmosphere[74]. The service hall can also serve as a space for residents to rest, read, and communicate, achieving the integration of service and social interaction. The practice of Jinchong Community in Hanzhong Street, Qiaokou District, Wuhan shows that by removing traditional service counters, expanding the service hall area, and adding various functional areas, the community space can become a warm home that residents "want to come, like to stay, and can also work together" in.

Second, the composite configuration of functional spaces. Within the limited building space, through flexible design and time-sharing, multiple functions can be superimposed. For example, the multi-functional activity room can be used for dance rehearsals, meeting discussions, cultural lectures, and children's activities at different times; the reading area can also serve as a community library;corridors and passageways can be equipped with display walls and rest seats, transforming into interaction spaces. The Jin Tang Community in Xiatang Street, Suzhou Industrial Park,led by the "embedded service" concept, comprehensively upgraded the original elderly activity room and created a "Happy Senior Home" comprehensive service center integrating chess rooms,reading areas,and health cabins,providing a reference model for the functional integration of Baiyun Garden Community[75].

Third，the addition of elderly-friendly and child-friendly functions. In response to the reality of a high degree of aging in Baiyun Garden Community and

the increasing demand for children's activities,additional elderly day care spaces，health monitoring corners, elderly-friendly rest areas, and children's activity corners should be added to the community service activity center. Elderly spaces should focus on slip-resistant floors,continuous handrails,adequate lighting,and seating layouts conducive to social interaction;children's spaces should ensure safety, clear views,and be equipped with age-appropriate activity facilities and soft flooring.

Fourth,the integration of community governance functions. Embed the discussion and consultation space into the community service activity center，setting up resident discussion halls,people's suggestions collection corners, and volunteer service stations,making the center an actual platform for community governance. The "Chenjia·Culture and Sports Meeting" project in Wuding Xinzhen Community of Nanjing Qin Hong Street integrates the library as both a "Literary and Cultural Consultative" library and a discussion meeting room,achieving the natural integration of reading and discussion, and this practice is worthy of reference by Baiyun Garden Community[76].

3.2.2. Space Activation Strategy: Revitalizing Public Spaces

The spatial activation strategy aims to enhance the vitality of the public spaces surrounding the community service activity center by conducting refined design and functional integration of the spatial nodes, thereby increasing the utilization rate and attractiveness of the spaces.

First, the entrance square space is reconfigured. The entrance square is the first impression space of the community service activity center and also an important place where residents stay and interact. The design should optimize the paving of the square, using permeable bricks and anti-slip materials to address the problem of water accumulation during rain. Additional shading facilities, rest seats, landscape ornaments, and night lighting should be added to enhance the comfort and safety of the square. Through the transformation of plant enclosure and ground paving, different functional areas such as morning exercise areas, rest areas and children's activity areas are divided to make the square space more diversified and

rich. The "Changlangfang" project in Qixia District, Nanjing adheres to the principle of "spending less and doing more" during the renovation process, and improves the quality of the space through the reuse of old materials and the exchange of resources. Its exquisite design concept is of great significance for the transformation of the entrance square[77].

Secondly, activate and make reasonable use of the surrounding space. There are often inefficient spaces such as building retreats, courtyards and corners around the community service activity center. These "idle resources" should be systematically sorted out and transformed into pocket gardens, neighborhood vegetable gardens and rest corners through functional replacement and small-scale renovation. Drawing on the strategy of "retaining trees + function replacement" in Zhengxiao Community in Ninghai County, the privately occupied vegetable fields will be re-planted and greened, and standardized parking spaces will be added at the same time to realize the reorganization and optimization of space functions.

Third, continue to improve the walking system. The sidewalks around the community service activity center should be effectively separated from the motor vehicle road to form a safe and continuous pedestrian network. The paving of the sidewalk should be kept continuous and flat, and night lighting and indicator signs should be set up. Cultural display boards, plant fences and rest seats can be arranged on both sides of the sidewalk, making the walking process a rich and diverse spatial experience. At the same time, the walking system should be effectively connected with the main activity nodes of the community (such as Sunshine Square, community entrance and fitness area)[78].

Fourth, optimization of the community boundary space. Drawing on the practice of transforming the boundary wall green space into a community corridor in Changliyuan in Shanghai, the boundary space around the community service activity center can be transformed into an active space with passing, resting, and interacting functions through wall beautification, green plant enclosure, and functional integration. The wall can be designed as a cultural display wall to

showcase the community history, residents' activities, and elements of Jinling culture, enhancing the identity of the place.

3.2.3. Cultural inheritance strategy: Preserving the historical context of the community

The cultural inheritance strategy aims to transform community cultural resources into spatial design language, and to continue the community memory and regional context in the updated public spaces.

First, the extraction and translation of regional cultural elements. Nanjing is a historical and cultural city with rich Lingnan cultural connotations. Baiyun Garden Community is located in Longjiang Area of Gulou District, adjacent to the Qinhuai River Scenic Belt. It is surrounded by public facilities such as Longjiang Gymnasium and Baiyun Garden Primary School, and has the conditions to integrate Lingnan culture into the design of community public spaces. The design can carry out cultural translation in the following aspects: integrating Lingnan cultural symbols such as Qinhuai water waves, willow leaf veins, and Ming City Wall bricks in the paving and wall design; extracting traditional color elements such as blue bricks and red columns from the color design; integrating cultural images such as Yunji patterns and Lingnan folding fans in the landscape sculptures. The Nanxiexi Area of Nanjing introduced intangible cultural heritage businesses and cultural activities to integrate traditional culture into daily life. This "intangible cultural heritage + life" symbiotic model can provide ideas for Baiyun Garden Community.

Second, the creation of space for community memory. Baiyun Garden Community was established in 2000. After more than twenty years of development, it has formed cultural teams such as waist drum, Tai Chi, and song recitation, as well as rich traditional community activities. The updated design should set up "community memory corner" or "Baiyun Garden Story Wall" in the community service activity center. Through old photos, residents' oral histories, and community event records, it can display the community's development process and cultural vitality. In the design of public spaces, elements with collective memory,

such as old trees, distinctive paving, and partial components of the original buildings, can be retained to create a resonance between the updated space and residents' memories[79].

Third, the daily cultivation of community cultural activities.Space design should provide suitable places and facilities for community cultural activities. Flexible and diverse multi-functional halls can be set up for daily activities, such as waist drum rehearsals, poetry recitation exercises and fashion shows; outdoor squares can be used to hold community fairs, festival celebrations and art performances. Through the dual cultivation of "space + activities", community culture can continue to develop in the updated space, enhancing residents' sense of cultural identity and community belonging.

3.2.4.Ecological restoration strategy: Optimizing community green infrastructure

The ecological restoration strategy aims to improve the ecological environment quality and environmental comfort of community public spaces through landscape optimization, construction of sponge facilities and protection of ecological resources.

First of all, optimize the community greening system. The greening rate of Baiyunyuan community has reached 35%. The greening foundation is relatively good, but there are still problems such as monotonous plant configuration and insufficient maintenance. Trees should be planted around community service activity centers to provide shade and reduce the heat island effect. The vegetation layer should be enriched, forming a multi-level structure composed of trees, shrubs and ground cover plants, and flower beds and seasonal change designs should be added to enhance the ornamental value of the landscape. Local plants and low-maintenance plants should be selected to reduce long-term maintenance costs. In the green space, accessible lawns and walkways should be set up to enable residents to get closer to nature[80].

Second, integration of sponge facilities into landscape design. Based on the entrance square of the community service activity center and the surrounding green

spaces, rain gardens, sunken green spaces, and permeable paving should be set up as sponge facilities. Rain gardens can be integrated into the landscape design and planted with plants that are tolerant of waterlogged conditions. They can form a miniature wetland landscape during the rainy season and become a leisure green space during the dry season. Permeable paving can be applied to the square and pedestrian paths to reduce surface runoff and alleviate the problem of water accumulation during rain. These facilities not only have ecological functions but can also serve as carriers for community environmental education.

Third, protection of existing ecological resources in the community. In the updated design, efforts should be made to retain the existing large and ancient trees within the community, which can be used as the core landscape elements of the public space. The retained trees can be combined with seats and shade facilities to form shaded rest areas. For the existing green spaces around the community service activity center, protection should be the main approach and renovation should be secondary. Avoid excessive hardening and landscape transformation. In the Xiaosongtao Lane renovation project, the practice of retaining tall trees and creating a three-dimensional public space green area by using different elevations is worthy of reference by Baiyunyuan Community.

3.2.5. Activate the surrounding area through community service activity centers

First, the radiating effect of the central node. The community service activity center is the core node in the community's public space system. Its renovation should have a radiating effect, driving the improvement of the quality of surrounding pedestrian paths, courtyard green spaces, squares, and other spatial nodes. The design can connect the center with surrounding spaces through a unified paving language, identification system, and greening style, forming a sense of unity. The entrance square of the community service activity center can serve as the "living room front yard", the surrounding green spaces can be the "back garden", and the pedestrian paths can be the "connection corridor", jointly forming a complete public space sequence.

Second, the networked connection of functional nodes. The community service activity center, the sunshine square, the fitness area, the children's activity area, and the community entrances and exits, etc., should be organically connected through the pedestrian system to form a "community public space network". Each node has different functional focuses and service radii, complementing and collaborating with each other. The community service activity center, as the core node of the network, provides comprehensive services; other nodes act as specialized nodes to meet specific activity needs.

Third, the catalytic effect of public activities. Space renovation should be combined with community activity organization. After the renovation of the community service activity center, regular activities such as cultural events, convenient services, consultation and negotiation, and festival activities should be organized to gather people and activate the space with popularity. The "Changlefang" project in Qixia District, Nanjing, through activities such as residents sewing cushions by hand and participating in the selection of the LOGO, has enabled residents to transform from "spectators" to "owners", and this participatory activity organization method can effectively enhance the cohesion and sense of belonging of the community public space.

Conclusions to the third chapter

1.The renovation of public spaces in old communities should follow four design principles: overall coordination, progressive renewal, continuity of context, and ecological sustainability.

2.Overall coordination treats the community service activity center and its surrounding public spaces as an integrated system, coordinating spatial, functional and temporal dimensions.

3.Progressive renewal advocates minimal intervention, phased implementation and cost control, as demonstrated by the “Changyingfang” project in Changying Village, Nanjing.

4.Continuity of context requires respecting community memory and cultural identity, and integrating local cultural elements into spatial design, as seen in the Xiaoxishui area of Nanjing.

5.Ecological sustainability focuses on improving green infrastructure, sponge facilities and resource conservation, drawing on the ecological background of Baiyun Garden Community.

6.Five design strategies are proposed: functional repair to improve the public service system, space activation to revitalize public spaces, cultural inheritance to preserve historical context, ecological restoration to optimize green infrastructure, and activating surrounding areas through the community service activity center.

7.These strategies are supported by reference cases such as Jinchong Community in Wuhan, Jintang Community in Suzhou, Changlefang in Nanjing, and Zhengxiao Community in Ninghai County.

CHAPTER 4

The Public Space Renovation Design Practice of the Community Service Activity Center in Baiyun Garden Residential Area

4.1. Interior function layout and space organization

4.1.1. Overall layout

The design for renovation of the indoor public space of the community service activity center of Baiyun Garden Community is based on the indoor space composition of "One Core, Two Axes and Multiple Nodes".

One core: the atrium of the community service activity center and the shared service hall form the one core. This space is the service and vitality core of the whole indoor public space of the building and is responsible for serving many purposes like receptions, consultations, resting, exhibition and assembly purposes. This is the core space that the residents get to know first when entering the center.

Two axes: North-South public service axis and East-West cultural experience axis. The public service axis is connected to the entrance hall, service hall, multi-functional activity hall, activity hall for the elders and the children's activity corner, thus forming an effective service flow line; The cultural experience axis is linked by the cultural display gallery, reading space, community memory space, neighborhood interaction space and shared living room, thus forming a space with reading, display, communication and leisure purposes.

The space includes several key nodes:the entrance hall, service hall, reading area, children's activity area, elderly activity area, neighborhood communication area, and cultural display area. These nodes are linked together through indoor corridors and shared spaces, with each function complementing the others, so that together they form a complete network of indoor public spaces.

4.1.2. Division of function

At the functional zoning level, the indoor public spaces of the community service activity center are divided into eight functional areas:

Comprehensive Service Area: Built around the service hall, this area includes an open service counter, a waiting area, a consultation area, and a community

service corner. It provides a full range of services, covering community affairs handling, policy consultation, and volunteer services.

Entrance Reception Area: Sitting just inside the building's main entrance, this is the first spatial node residents encounter when entering the center. It handles reception, waiting, guidance, and announcement display. Through ground paving, lighting signs, and furniture arrangement, it creates a warm, clear, and welcoming entrance atmosphere.

Cultural Display Area: Spread across the entrance foyer, corridors, atrium, and the surrounding reading areas, it makes use of cultural display walls, community memory corners, and publicity boards to showcase the history of community development, cultural and sports achievements, and elements of Jinling culture.

Reading and Learning Area: Set on one side of the service hall or in a quieter corner, it comes with bookshelves, reading tables and chairs, electronic reading equipment, and study spaces — covering residents' needs for reading, learning, and communication.

Multifunctional Activity Area: Centered on the multi-functional activity room, it uses flexible partitions and movable furniture to adapt to different uses, from dance rehearsals and meeting discussions to cultural lectures and children's activities.

Children's Activity Area: Located on the first floor of the building, it hosts picture book reading, handicraft making, and game activities. The design is safe, soft, and rounded, creating a truly child-friendly space.

Senior-friendly Activity Area: Covering day care, chess activities, health monitoring, and rehabilitation training, it takes full account of the elderly's physical characteristics and behavioral habits, with adaptive furniture and barrier-free facilities throughout.

Neighborhood Interaction Area: Making use of widened corridors, corner areas, and the edges of the atrium, it sets up neighborhood sharing corners, rest

seats, and information exchange boards — giving residents indoor spaces to interact and socialize.

4.1.3. Traffic flow optimization

The optimization of indoor traffic flow follows the principle of "clear flow, short and efficient, unobstructed, fire evacuation safety". According to user characteristics and their behavior, the indoor flow line is divided into resident business flow line, employee flow line, logistics support flow line and barrier-free flow line.

The flow of resident service starts from the entrance lobby and radiates to various functional spaces, ensuring that residents can quickly reach the service desk, reading area, multi-functional activity room, children's activity area and elderly activity area. The employee mobility line is relatively independent to avoid cross-interference with the permanent mobility line. The logistics support flow line connects the storage room, computer room, bathroom and logistics entrance to ensure the convenience of daily operation and maintenance.

The entrance hall, service hall, corridor, bathroom and main activity space all adopt barrier-free flow lines to ensure that there is no height difference, non-slip floor, appropriate door width and wheelchair operability. The width of the main corridor is not less than 1.8 meters, and the width of the barrier-free passage is not less than 1.5 meters. There are rest seats and armrests at the corner. The fire evacuation line is combined with the building safety exit to ensure that the evacuation passage is clear, the sign is clear, and the emergency lighting is complete.

4.2. Interior public space design

4.2.1. Community Entrance Space Design

The entrance space of the community service activity center is the first spatial node for residents to enter the center. The design focus is on enhancing recognition, improving affinity, and creating a sense of stay.

In terms of entrance signage design, a prominent community sign is set above the main entrance of the center building. In line with the cultural characteristics of

Baiyun Garden Community, a simple and modern design language is adopted. The material of the sign can be selected from weather-resistant steel plates or wooden grilles, reflecting the warmth of the community. On both sides of the entrance, community activity information boards and welcome slogans can be set up to enhance residents' sense of belonging.

In terms of entrance square design, the paving material is optimized, using a combination of permeable bricks and anti-slip stones, with a warm gray tone as the main color, supplemented by local colored paving to guide the flow of people. The square area is approximately 200 square meters, with sunshade pergolas, rest chairs, and landscape ornaments set up to form a transitional space for stay. On one side of the square, a non-motorized vehicle parking area is set up to solve the problem of parking occupying activity space.

In terms of accessible entrance design, the entrance steps are transformed into a combination of gentle slopes and steps, with continuous handrails and anti-slip strips. The entrance platform is equipped with rest chairs to facilitate elderly people's stay and transfer to wheelchairs. The entrance lobby uses automatic doors or lightweight sliding doors to facilitate the passage of wheelchairs and baby strollers.

4.2.2. Design of the Central Square

The central square is located in the connecting area between the community service activity center and the Sunshine Square. It is the core public space where community residents gather, hold activities and interact. The design is based on the concept of "community living room", creating an open, dynamic and diverse public activity venue.

The square space is divided into three functional areas through pavement variations and plant enclosures: the assembly and activity area, approximately 300 square meters, with flat pavement, which can accommodate community festivals, artistic performances and market activities; the leisure and interaction area, approximately 200 square meters, with tree-lined seats, shade umbrellas and landscape ornaments, creating a pleasant social atmosphere; the children's activity

area, approximately 150 square meters, equipped with age-appropriate recreational facilities, with soft and safe pavement.

The green space design is based on preserving the existing trees. Circular seats are set under the trees to form a natural shaded resting area. New flower beds and ornamental grass are added to enrich the plant layers and seasonal changes. Rain gardens are set at the edge of the square to collect rainwater runoff, combining ecological functions and landscape effects.

4.2.3. Neighborhood Interaction Space Design

The neighborhood interaction space is set at the intersection of the green spaces and pedestrian paths between the buildings surrounding the community service activity center, providing a place for residents to interact and relax on a daily basis.

The design adopts the "pocket park" spatial model, setting multiple small interaction spaces on the green areas on the east and south sides of the building. Each interaction space is approximately 30-50 square meters, equipped with seats, small tables, shading facilities, and greenery enclosures, forming a warm and private neighborhood communication place.The interaction spaces are connected by pedestrian paths, forming a continuous social space network.

On the north side of the building, a "neighborhood sharing corner" is set up, equipped with shared tool cabinets, information exchange boards, and community notice boards, facilitating residents to exchange items, share information, and interact. The design of the sharing corner references the "tool sharing area" in the "Changlefang" project, reflecting the spirit of community mutual assistance.

4.2.4. Children's Activity Space Design

The children's activity space is set on the south side of the central square and inside the community service activity center building, meeting the activity needs of children of different ages.

The outdoor children's activity area is approximately 150 square meters, equipped with slides, climbing frames, sand pits, etc., suitable for age-appropriate recreational facilities. The ground is paved with EPDM soft safety paving, with

bright colors, dividing different age activity areas. Surrounding the activity area, there are parent supervision seats and shading facilities to ensure clear vision. The activity area is separated from the vehicular road by a green isolation belt to ensure safety.

The indoor children's activity corner is set on the first floor of the central building, approximately 40 square meters, equipped with a picture reading area, a handicraft making area, and a game area. Using rounded furniture and soft floors, the walls are set with a children's work display area, creating a warm and safe children-friendly space.

4.2.5. Elderly-Friendly Activity Space Design

The elderly-friendly activity space is set inside the community service activity center building and near the entrance square, fully considering the physiological characteristics and behavioral habits of the elderly.

The indoor elderly-friendly activity space includes an elderly day care area, a chess activity area, and a health monitoring corner. The day care area is approximately 60 square meters, equipped with adjustable reclining chairs, coffee tables, and storage cabinets, providing a day rest and social space for the elderly. The chess activity area is approximately 50 square meters, equipped with elderly-friendly tables and chairs, with cup holders and handrails on the tabletop, and the seat height is moderate with backrests and handrails. The health monitoring corner is equipped with blood pressure monitors, weighing scales, and health publicity materials.

The outdoor elderly-friendly activity space is set in the east side of the entrance square as a fitness equipment area, equipped with low-intensity fitness equipment suitable for the elderly. In the green space, a circular walkway is set up, with smooth and non-slip paving, and rest seats and handrails are placed along the way. The walkway is approximately 200 meters long, with a gentle slope, convenient for the elderly to walk and do rehabilitation training.

4.2.6. Optimization of Internal Public Spaces in the Community Service Center

The internal public spaces of the community service center are optimized based on the principle of "minimizing office space and maximizing service functions", transforming traditional isolated service counters into open service desks, adopting a "side by side" service mode. The service hall is approximately 150 square meters, equipped with sofas, coffee tables, greenery, bookshelves, etc., creating a warm atmosphere.

The reading area is set on one side of the service hall, approximately 60 square meters, equipped with bookshelves, reading tables and chairs, and electronic reading equipment. The reading area can also be used as an space and community library,and regular reading sharing activities are held.

The multi-functional activity room is approximately 100 square meters,with flexible partition design,which can be divided into two spaces as needed. It is equipped with projectors,sound systems,folding tables and chairs,etc. meeting the needs of dance rehearsals,meeting discussions,cultural lectures and children's activities.

Corridors and atrium spaces have community culture display walls,displaying community history photos,cultural activity records and residents' art works. At the corner of the corridor,there are rest seats and greenery,converting the traffic space into an interaction space.

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ANNEX A. (Tables and diagrams)

Table 1. National Policy Documents on the Renovation of Old Communities (China)

YEAR	FILE NAME	CONTENT SUMMARY
2020	《Guiding Opinions of The General Office of the State Council on Comprehensively Promoting the Renovation of Old Urban Residential Areas》	This is a guiding document for the renovation of urban old residential areas. It clearly identifies the key areas for renovation as those built before 2000. The renovation contents are classified into three categories: basic, improvement, and enhancement. It also proposes a mechanism for sharing the renovation funds among the government, residents, and social forces. It is required that by the end of the "14th Five-Year Plan" period, the renovation tasks of the residential areas built before 2000 that need renovation should be basically completed.
2023	《"Notice of the Ministry of Housing and Urban-Rural Development on Solidly and Progressively Promoting Urban Renewal Work"》	It is proposed to prioritize urban health checks, and comprehensively promote urban renewal work such as the renovation and upgrading of existing buildings, the renovation of urban old residential areas, the construction of complete communities, and the creation of vibrant streets. At the same time, guidance and regulations should be provided for the methods of urban renewal in local areas.
2023	《Notice on Steadily Promoting the 2023 Urban Old Residential Area Renovation Work》	Issued jointly by the Ministry of Housing and Urban-Rural Development, the National Development and Reform Commission, and other seven departments, this document outlines the measures for all regions to actively implement the 2023 urban community renovation plan and to proactively plan the 2024 renovation plan.
2024	《Notice from the Office of the Ministry of Natural Resources on Further Strengthening Planning and Land Policy Support for the Renovation and Upgrading of Old Residential Areas》	The deployment covers four aspects: deepening investigation and assessment, strengthening planning coordination, enhancing policy support, and optimizing approval procedures. It is clearly stated that the scattered land in old residential areas and surrounding marginal and sandwich areas should be prioritized for the expansion of public spaces and public service facilities. It also encourages the mixed use of existing urban land and the functional transformation of existing building spaces.
2025	《Opinions of the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council on Continuously Promoting Urban Renewal Actions》	"Promoting the renovation and upgrading of urban old residential areas" has been designated as an important task of the urban renewal initiative. It requires the replacement of aging pipelines and conduits in the residential areas, the rectification of walkways and exhaust ducts within the buildings, and the complete elimination of potential safety hazards. Support will be provided for the installation of elevators in eligible buildings, and the long-term management mechanism of the residential areas will be improved simultaneously. Emphasis will be placed on guiding residents' participation and supervision.
2026	《The "15-19" Urban Renewal Plan》	It is clearly stated that during the "14th-15th Five-Year Plan" period, efforts will be continuously made to renovate urban old residential areas. At the same time, the construction of complete communities will be accelerated. It is planned to implement the construction and renovation of complete communities in 5,000 communities, improving public service facilities such as community elderly care and child care, and increasing public activity areas and green spaces according to local conditions.
2026	《Urban Renewal Project Loan Management Measures (Trial)》	Clearly, support for urban renewal project financing should be based on the principles of marketization and legalization. Projects applying for loans must have sufficient operating income to cover the principal and interest of the loans. The loan term should be reasonably determined based on factors such as the construction and operation cycle, and the source of repayment. Financial support should be provided for projects such as the renovation of old residential areas.

Table 2. Documents related to the renovation of old communities (international)

YEAR	FILENAME	CONTENTSUMMARY
1954	The United States《Housing Act of 1954》	For the first time, "urban renewal" was used instead of "slum clearance", and the renewal methods were expanded to include demolition and reconstruction, restoration and renovation, as well as maintenance and preservation.
1974	The United States《Housing and Community Development Act of 1974》	The Community Development Block Grant (CDBG) was established, with the funds available for improving community facilities, restoring buildings, and eliminating slums and decay. It is the most enduring federal funding framework in the field of community renewal in the United States.
1960	《The "Residential Area Improvement Law" of Japan (Law No. 84 of 1960)》	In order TO improve the environmental health and safety conditions of dense residential areas and promote the construction of healthy and livable residential collective, the designated procedures of improved areas, the construction standards of improved residential areas and the requirements of regional facilities are stipulated.
1992	The United States《HOPE VI Revitalization Program》	The conversion of high-poverty neighborhoods to mixed-income neighborhoods through the demolition of severely decaying public housing projects and the construction of new mixed-income neighborhoods is one of the largest and longest-running federal neighborhood renovation programs in the United States.
1999	《The "Social City" program in Germany》	The Federal-State Joint Urban Renewal Program has been providing funding for integrated community development in disadvantaged areas since 1999. Through the construction of facilities and spaces, the repair of spatial deficiencies, the establishment of social infrastructure, the strengthening of local organization networks, and the support for citizen participation, it aims to improve living and employment conditions and maintain a stable resident structure.
2014	《The "National Plan for Urban Renewal in France" (NPNRU, 2014 - 2027)》	Targeting the most dysfunctional "priority blocks" (QPV) in the city, the gap between priority blocks and the rest of the city is narrowed through interventions such as public space creation and restoration, residential renovation and demolition, and public facilities construction and renovation, requiring residents and association representatives to participate in project definition, implementation and evaluation.
2025	《The "Neighborhood Plan" of the United Kingdom》	£1.5 billion to promote community renewal in 75 areas, supporting the development of green Spaces and community gardens, new or improved community infrastructure, town centres and high streets, with regeneration plans developed by local neighbourhood committees.
2025	《The "Revitalize Our Neighborhoods Act of 2025" of the United States》	Authorizes the Department of Housing and Urban Development to provide competitive grants to state and local governments and cross-jurisdicting entities for the removal of blighted buildings, renovation of abandoned structures, and construction or preservation of affordable housing, requiring applicants to develop five-year plans that match no less than 15% of the grant amount.

ANNEX B. Prototype for the Renovation Design of Public Spaces in Old Communities

Figure 1:Baiyunyuan community design basic research

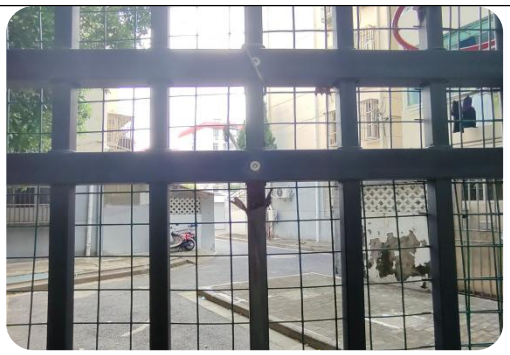





Figure 2:Case Analysis

Shanghai Bosom Friend Community "Bosom Friend 'XIN Space'"




BEFORE	AFTER

ANNEX C. Project proposal

Nanjing Baiyunyuan Community public space renovation design scheme: community activity center

1.Community center floor plan



2.Entrance reception and service desk



3.Design of corridor



4.A leisure room



5.The waiting area doubles as a book bar



6.Multi-function conference room



7.Design of toilet





