

# Research on the Development and Space Optimization of Rental-Type Public Housing in Hangzhou

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**Abstract**—In recent years, China has made great efforts to cultivate and develop the housing rental market, especially the rental-type public housing, which has been paid attention to by all sectors of the society. This paper takes Hangzhou rental-type public housing as the research object, and divides it into three development stages according to the different supply modes of rental-type public housing. Through data collection and field research, the paper summarizes the spatial characteristics of rental-type public housing from the five perspectives of spatial planning, spatial layout, spatial integration, spatial organization and spatial configuration. On this basis, the paper proposes the optimization of the spatial layout. The study concludes that the spatial layout of rental-type public housing should be coordinated with the development of urban planning. When planning and constructing, it is necessary to select more mixed construction modes, to be properly centralized, and to improve the surrounding transportation service facilities. It is hoped that the recommendations in this paper will provide a reference for the further development of rental-type public housing in Hangzhou.

**Keywords**—Hangzhou, rental-type public housing, spatial distribution, spatial optimization.

## I. INTRODUCTION

HANGZHOU document has always been at the leading level in China in terms of housing security. With the housing security system shifting from “renting and selling, selling to the main” to “renting and selling, rent-based”, rental-type public housing has attracted more and more attention. Rental-type public housing is a guarantee of housing, it is a new housing security model launched after low-rent housing and affordable housing. It is owned by the government or the company, and these houses are rented at a lower than the market price but higher than the rent of the low-rent housing to the “sandwich” crowd with housing difficulties. Focusing on the housing difficulties of the new graduates, the entrepreneurs and the migrant workers.

## II. DEVELOPMENT HISTORY

However, compared with the mature development of the public housing system in Europe and the United States, Hangzhou's public housing is still in the development stage. According to different supply modes of rental-type public housing in different periods, it is divided into three stages.

### A. Preparation Phase (2003~2010)

The original idea of rental-type public housing in Hangzhou began in 2003 with the aim of solving the housing problems of newly hired university graduates. Since November 2009, a comprehensive pilot projects have been launched to build 97 housing units. From December 1st, the application for the “Economic Rental Housing” pilot application was accepted, marking the entry into the substantive operation stage of the “economic rental housing” in Hangzhou.

### B. Centralized Construction Phase (2010~2012)

In June 2010, the “Guiding Opinions on Accelerating the Development of Rental-Type Public Housing” was issued, which raised the rental-type public security system to the national strategic level for the first time. Hangzhou City responded positively and established a “six houses develop simultaneously” housing supply system with Hangzhou characteristics. Establish a government-led and centralized construction supply, and actively establish a policy system for the allocation and utilization of residential housing projects. Concentrated construction can stimulate the rise of rental-type housing in a short period of time, alleviating the serious shortage of rental-type housing, especially suitable for the special shortage of housing, and facilitate the rapid establishment of the housing system framework [1]. In June 2013, the first batch of Tianyuan projects were in place. By 2014, the Hangzhou government developed and built seven centralized rental-type public housing projects, which were completed and put into use.

### C. Distributed Construction Phase (2012 to present)

At this stage, rental-type public housing projects are mainly based on distributed construction supply, while absorbing and utilizing stock housing to increase the supply of rental-type public housing. Compared with centralized construction, the distribution of rental-type public housing in housing communities has obvious advantages in strengthening community integration [2]. In 2011, Hangzhou clearly defined the distributed construction of rental-type public housing in commercial residential projects as the main way of providing physical housing for rental-type housing. The distributed construction of rental-type housing for commercial housing in Hangzhou began. However, the actual operation results are not

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satisfactory. As of 2017, before the pilot project of housing leasing in Hangzhou, Hangzhou has built more than 20,000 rental-type public houses with a total distributed construction area of more than 1.2 million square meters [3].

In August 2017, the “Hangzhou City Pilot Work Plan for Accelerating the Development and Development of the Housing Leasing Market” was issued, and it was clearly stated:

“The proportion of rental-type housing for the construction of commercial residential projects in the main urban area is not less than 10% of the total construction area. Xiaoshan District, Yuhang District, Fuyang District, the proportion is not less than 5%.”

Since the implementation of the policy of commercial housing for the allocation of rental-type housing, a total of 65 commercial residential land involving construction and distribution has been launched, and 464,700 square meters of rental-type housing will be built. The implementation of the rental-type housing construction policy has achieved remarkable results.

### III. SPATIAL DISTRIBUTION CHARACTERISTICS

#### A. Matching with Urban Planning

At present, the matching between the layout of rental-type public housing in Hangzhou and the development of urban planning is not high. In general, the rental-type public housing layout is “advanced” in Hangzhou planning and development. The planning and development level of Hangzhou can not meet the needs of the location of rental-type public housing, which has caused a serious spatial mismatch. The layout structure of the urban planning in Hangzhou in 2020 is changed from the core of the old city to the network group layout with the Qian Tang River as the axis. Formed an open space structure of “a group of three pairs, two-hearted two-axis, six groups, and six ecological belts”, as shown in Fig. 1. Nowadays, Hangzhou's main resource facilities are still mainly concentrated in the old city. Hangzhou city-level rental-type public housing is scattered in the Liangzhu, Linping, Pingyao, Xiasha and Jiangnan groups outside the old city. It is still a long time for the planning service supporting facilities in the sub-group to mature. Rental-type public housing is the first to be placed here. According to the

distance from the city center, It will inevitably lead to the spatial differentiation of a large number of people returning to the old city during working hours and entertainment facilities around the Residence are difficult to meet the user's needs.

#### B. Spatial Layout of Macro-Level

As far as Hangzhou is concerned, there are three main houses for rental-type public housing: one is the self-constructed project of the city-level rental-type public housing designed and independently constructed by Hangzhou Housing Security Department and the second is the housing acquired by the Hangzhou Housing Management Committee, the Construction Committee and other relevant departments. The third is the development of the project according to the requirements of the developer, including the two types of construction in different places and commercial housing projects [4]. The types, quantities and land grades of self-built and acquired projects are shown in Table I.

The author describes the distribution of rental-type public housing projects that can be accommodated at the city level in Hangzhou by 2018 as shown in Fig. 2. At the macro level, it is concluded that the distribution of rental-type public housing is characterized by suburbanization and distribution.



Fig. 1 Analysis diagram of Hangzhou future urban planning group (self-painting)

TABLE I  
NUMBER AND LAND GRADE OF SELF BUILT AND ACQUIRED RENTAL-TYPE PUBLIC HOUSING PROJECTS

Category	Numbering	Project	Total number of sets (sets)	Land grade (level)	Rental price (yuan/m <sup>2</sup> ·month)
Self-built project	A1	Tianyuan Land	4693	8	10.5
	A2	Jiangcun Land	1215	6	16
	A3	Qinglong Land	1492	5	21
	A4	Tangbei Land	839	5	21
	A5	Niutian Land	1180	7	12
	A6	Huayuangang Land	1033	6	16
	A7	Sanliting Land	303	3	29
Acquisition project	B1	Dingqiao United Courtyard	914	7	12
	B2	Santang High-rise Apartment	129	6	16
	B3	Champagne Apartment	50	6	16

The number in Table I shows the position in Fig. 2.

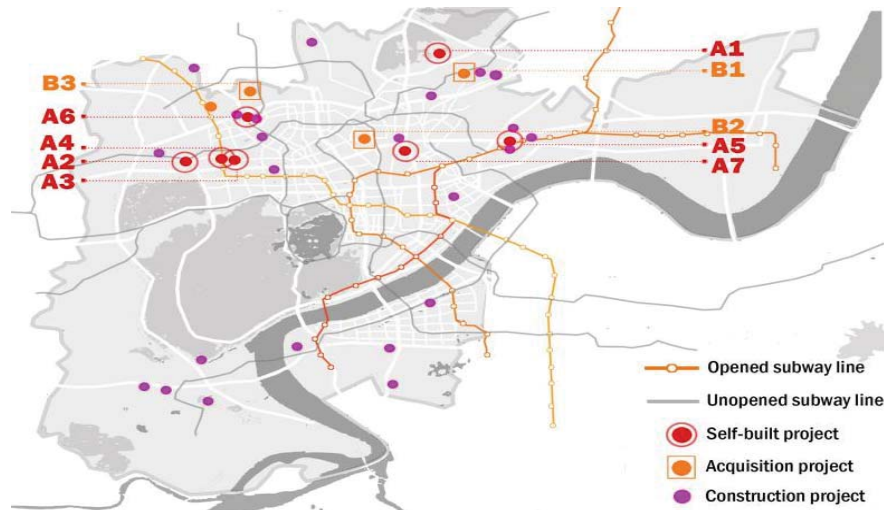


Fig. 2 Location map of various types of rental-type public housing in Hangzhou City

Since 2012, Hangzhou has implemented differentiated rent pricing according to different grades of land. Its land price level is divided into 8 levels, and the average rent level is 70% of the market rent in similar locations. Most of the self-built rental-type public housing projects are at level 6 or level 7. The rental-type public housing projects at level 1 and level 2 are not available. The site selection is for low-end land use combined with urban and rural areas. There is no rental-type public housing in the city center. Centralized self-construction and acquisition projects were built earlier, with more housing resources, all located in the north of the old city. Among them, only the number of rental-type public houses in the Tianyuan land project is 4,693, which is relatively the most remote. The Sanliting land project has the lowest rental-type public housing project, but it is the closest to the city center and the surrounding traffic is the most convenient. The biggest problem of centralized large-scale construction of rental-type public housing is that the government needs large investment and it is difficult to sustain in a long term; construction site selection is difficult, and renters lack opportunities for location selection; concentrated living of a large number of low-income families lays a hidden danger for the formation of "slums". In recent years, due to policy mandatory requirements, the number of Distributed construction projects in commercial housing communities has increased significantly, and the old cities are distributed around the city, mainly between 300 and 500 sets. The newly opened Kaixuan Unit is located in a prime location. It has alleviated the problem that the location of the centralized construction is too remote. It is conducive to alleviating the spatial differentiation caused by centralized construction. But the number is still insufficient.

#### C. Spatial Fusion of Micro-Level

At the micro level, the spatial integration outside the rental-type public housing area has the characteristics of concentrated to mixed development and obvious spatial isolation. Most of the centralized rental-type public housing areas are interspersed with low-rent housing units, affordable housing units and

commercial housing units. The poorly-equipped affordable housing area is adjacent to the elegant and chic wealthy people. The populations of different communities are basically inaccessible. The separation of the two groups of people will become more apparent, and the isolation of living spaces will be formed invisibly. The distributed construction project is a mixed configuration of different types of housing in the community. Compared with the centralized rental-type public housing, the supporting facilities in the community will be much better. With the increase in distributed construction projects, the phenomenon of spatial isolation has been alleviated. It is conducive to promoting the formation of a mixed mode, which has a certain inhibitory effect on the phenomenon of "slums", which is conducive to social harmony and increases the choice of residents.

From the perspective of internal space integration: Rental-type public housing and residential areas need to meet the performance and economic performance requirements, but there is basically no physical fitness facilities. The outdoor venues that can serve as communication spaces are mainly small squares and corridors. There is basically no collective activity in the community. Therefore, these space utilization rates are low, the frequency of household interaction and communication is low, and the organization and construction of community culture are lacking. The residents lack serious sense of belonging and identity to the community.

#### D. Spatial Organization

The distinctive feature of Hangzhou rental-type public space organization is that the traffic is not convenient enough, and the commuting cost of the residents is high, but the future can be expected. At present, only 1, 2 and 4 lines are opened in Hangzhou Metro. In the self-construction and acquisition of rental-type public housing, only the Tangbei land and the Niutian land can be conveniently located depending on the subway, and other projects are not in the radiation range. For public transportation facilities, in addition to the Santang apartment, there are problems such as the lack of surrounding

bus stations and bus lines, and the low level of public transportation services. Taking Dingqiao United Courtyard as an example, there are only 7 bus stops and 7 bus lines within 1km, which is far from enough for residents in the residential area with a large number of buses as the main means of transportation. In the rental-type public housing project, the audience is mainly graduated college students and entrepreneurs. Most of the working places are located in the economically prosperous city center. The living and working places are staggered and far apart, which is easy to form a “space mismatch”.

It is estimated that by 2020, 15 subway lines in Hangzhou will be completed and put into operation. At that time, most of the rental-type public houses in Hangzhou will be covered with the subway. With the formation of the decentralized urban structure in Hangzhou, the working resources are scattered to the periphery, which will alleviate the “space mismatch” situation. But before that, there will still be traffic problems for a long time.

#### *E. Spatial Configuration*

The characteristics of the supporting facilities of rental-type public housing are considerable in quantity and the service level

is generally not high enough to meet the needs of residents. The author has drawn a Table II of the number of supporting facilities around the 7 major rental-type public housing projects. Taking the self-built rental-type public housing project as an example, the quantity and quality of the supporting facilities around the Sanliting project are optimal in the facilities and facilities. The largest Tianyuan project is 12km from the city center, and the remaining major rental-type public projects are more than 8km away from the city center. In addition to the lack of kindergartens and health service stations around the Tianyuan project, each project area has basic services such as medical care, education and entertainment. Although the number seems to be considerable, the service level of various facilities is not high. For example, there is no hospital with a qualification level of three or more levels around Jiangcun, Huayuqiang and Niutian programs. From the quantitative analysis, there are thousands of households in the rental-type public housing project area, and then consider many other nearby communities. Obviously, the existing medical facilities and the services that primary and secondary schools can provide are in short supply.

TABLE II  
NUMBER OF SUPPORTING FACILITIES AROUND THE SEVEN CENTRALIZED RENTAL-TYPE PUBLIC HOUSING

Project	Number of health stations (within 1km)	Number of hospitals (within 3km)	Number of kindergartens (within 1km)	Number of elementary schools (within 2km)	Number of large shopping malls (within 2km)
Tianyuan	0	3	0	4	3
Jiangcun	1	3	1	2	5
Qinglong	4	5	1	4	6
Tangbei	3	4	1	3	6
Niutian	2	4	2	3	5
Huayuqiang	2	4	1	3	5
Sanliting	2	5	2	3	6

#### IV. SPACE OPTIMIZATION ADVICE

##### *A. Spatial Planning Matches the Degree of Planning Development*

Rental-type public housing should consider Hangzhou's future urban structure planning in terms of specific location selection. Hangzhou is expanding from the central residential circle to the sub-central residential and suburban residential areas. In urban planning and development, only urbanization and suburbanization advance at the same time. The agglomeration effect and the diffusion effect coexist at the same time. The urban and suburban areas develop in harmony, and the urban organism will grow [5]. The sub-center residential circle can truly become the “main battlefield” for absorbing the population, and the rental-type public housing projects distributed among them can develop well.

##### *B. Regional Selection Moves Closer to the City Center*

The central city has an incomparable location advantage in the suburbs and is the best place for low- and middle-income workers to live and work. Although the land in the city center is not likely to become a site for the construction of new rental-type public housing due to its superior location conditions. The

less desirable residential land in the urban area can be converted into a rental-type public housing project, and the government can adopt mandatory policies to guide the development of land and properly construct rental-type public housing in the central city. As far as possible, suburban plots should be located near the opened subway line, shorten the commute time and ease the space mismatch caused by the suburbanization of rental-type public housing.

##### *C. Advocating Residential Mixing and Promoting Communication*

The main audience of rental-type public housing is the middle- and low-income class, and their living differentiation with high income groups will reduce their job opportunities. Because of the passive space segregation, the next generation of the disadvantaged groups will lack the opportunity to integrate into the mainstream of society. Residential differentiation leads to the abandonment of mainstream communities to poor areas, causing problems [6]. Hangzhou's policy restrictions in recent years require that no less than 10% of rental-type public housing be built. When building a mixed community, can build a mix of different areas and different types of housing to create opportunities for different classes of



communication. At the same time, many residents of Hangzhou rental-type public housing show obvious psychological exclusion and self-isolation attitude, and mixed living can not truly achieve the spatial integration of different classes. Therefore, it is necessary to change the inferiority of the low-income class and form a culture of equality and respect for others in the community. On this basis, community interactions will be established between the neighborhoods, community culture construction will be carried out on a regular basis, mutual understanding of different classes will be promoted, and internal cohesion will be strengthened. Enable the low-income class to obtain employment opportunities with the help of the high-income class in order to make better use of social resources and eliminate the social costs caused by spatial polarization.

#### *D. Taking into Account the Supporting Facilities and Space Mismatch*

In the process of urban development, Hangzhou should aim to improve the convenience and accessibility of public service facilities such as medical care, education and entertainment according to the distribution of public rental housing. For the newly-built rental-type public housing project, the bus route and the station can be designed by investigating the main travel destinations and travel routes of the rental-type public housing community and its surrounding residents, and the bus shifts should be appropriately increased during the peak period to alleviate the difficulty of travel. Continuously improve subway traffic, expand its coverage, and further shorten travel time and costs. By investigating the spending power of residents around rental-type public housing, we will guide the rational distribution of public resources, appropriately increase the employment of rental-type public housing in the suburbs, increase the allocation of entertainment facilities, improve the service quality of shopping facilities, and optimize the living environment of residential areas. In view of the characteristics of young people in the rental-type public housing audience, the balance between housing and homesickness, the harmony of tradition and modernity, and the emotional, cultural and aesthetic needs of young people are met. Enhance the attractiveness of rental-type public housing to young people.

#### V.CONCLUSION

Hangzhou's rental-type public housing is not only a low-cost housing for low-income people with low income, but also a breeding ground for Hangzhou's backbone. For the construction of rental-type public housing in the future, it should use more mixed construction mode. Promote the exchange and integration of different classes and encourage public participation in the construction of community culture. And has a relatively good geographical location and traffic conditions. According to the spending power of the inhabitants in the site selection area, the cultural facilities should be appropriately increased. A residential area that creates a vibrant and creative atmosphere. Provide a better living environment for young people who work hard or start a business in Hangzhou. Promote

the healthy and orderly development of urban planning in Hangzhou.

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