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Research of Public Housing in Chiayi Trend of Universal Design

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Abstract

Chiayi City was the first city built in Taiwan. Under Japanese colonial rule t, Chiayi City became the second densely populated city in Taiwan due to Alishan Forestry. In recent years, Chiayi City Government has promoted urban renewal, improved the living environment, and enhanced urban functions as the main goals of urban development. Expediting the reconstruction of unsafe and old buildings in the urban planning district is its specific plan. The built public housing in Chiayi has reached an expected useful life, and the building safety and quality of life do not meet the current needs for the residential environment any longer, which leads to the gradually migration of the population in these areas. This research will take the trendy design of open building to address new design concepts of a new public housing for to facilitating residential building safety and improving environmental quality in Chiayi City.

Keywords: Chiayi; Public housing; Built Environment; Urban Design; Residential building safety.

1. Introduction

In an aging society with fewer children, the practice of "aging in place" has been gradually implemented in Taiwan and international. Emphasizing that the elderly in the process of aging can receive enough care resources and largely improve the condition of their participation in social activities in the place where they were born and bred. existing growth environment and the lifestyle of social participation food; The current family household structure has also changed into a multiple family structure. pluralistic pattern. Different families form different generations of elders who need to be taken care of. Although the Government has promoted relevant policies, there are still many social problems to be solved; Therefore, society must provide a community that can meet the needs of multiple generations of mutual support and care.

Under Japanese colonial rule, During the Japanese occupation period, because of the forestry timber industry in Alishan, Chiayi became the city with the second highest population density in Taiwan. Due to the soaring population of industry, the housing demand increased greatly, and the government also built many public state houses to alleviate this problem. With the rise of the awareness of environmental conservation, the forestry timber industry is declining, and the population is gradually moving out. In recent years, the population is aging rapidly. The once-hot neighborhoods used to be a very lively place have but now turn out to be grey areas in under urban planning. The purpose of this study is to explore the possibility of changing the existing public national house community by means of open building theory. In that way, need in order not to demolish any of that, but in some way of through extension, addition, renovation, and reuse to sort out a set of suitable system of space variations for the public housing national residence community space change mode. It is hoped that proposing the possibility of adapting to the change of existing public house community through the analysis of domestic and foreign cases on the renewal of design methods with the open building architecture theory. Besides, combining universal general design with and the concept of barrier free environment.

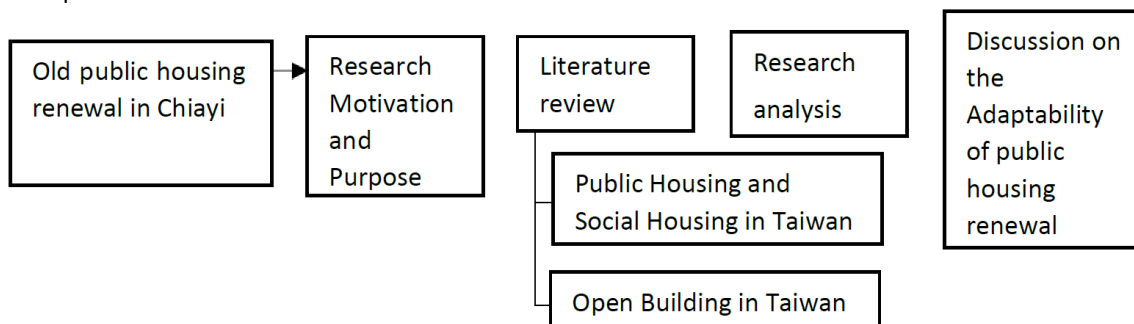


Figure 1. Structure of the Study (Developed by Author).

2. Literature review

2.1. Contemporary Development of Taiwan Public Housing

In early times, housing policy welfare do have profound effects in Taiwan. First, Taiwanese people seem to have some ideas of “The more real estate we own, the wealthier we have become.” Therefore, people tried to purchase as many real estates as we could. Second, dates to December in 1949, toward the end of active battles in the Chinese Civil War, the Kuomintang (KMT), its officers, and approximately 2 million troops took part in the retreat, what also known as “The Great Retreat”. Instantly, the number of populations in Taiwan grew sooner than we expected. Third, some parts of families make lower incomes than others. Forth, Taiwan is truly a small country with the problem of high population density, which means the price of our lands are remaining obstinately high. To sum up, our government provided with kinds of housing loan interest subsidies which related to the problem I just mentioned above. As the social and economic situation has been different, people's demand for housing somehow has not changed (Li-Chun, Chen, 2008).

Table 1. Structure of the Study (Developed by Author)

Time	Relevant Housing Policy in the past
1949-1957	In 1949, after “the great retreat”, there were the problem such as population in Taiwan increased sharply and lack of funds and housing. The quality and quantity level of housing are extremely low, which can be said to be the most serious period of housing problems in Taiwan. After 1950s, the Ministry of National Defense successively built military villages for the purpose of resettling dependents of the National Army, which was the beginning of government's participation in housing subsidies.
1958-1964	The housing subsidy was targeted at low-income families, and Loan-to-Value (LTV) was as high as 80% of the standard price. The interest rate was 0.5% per month for 15 years. However, the living area of houses were very small, respectively were 40982 square inches, 51239.9 Square inches, 61487.88 square inches.
1965-1975	During this time, government focused on the issue of housing policy, housing subsidies. The first was that government started to build public housing in 1964 and sold them to lower income families with cost price. After 1965, there were housing subsidies for different occupational identity. The government directly built and then sold them to public and civil service officers at cost price, and provided loan interest subsidies, or only loan interest subsidies. Affordable housing (housing exclusively for registered low-income households) is also being built at a very low price. Rent or free occupancy provided to qualified tenants.
1976-1994	1975 housing policy gradually institutionalized and legalized, public organizations also gradually improve. The county and municipal governments are established national house dedicated units, actively dealing with the direct construction of national housing. To assist lower income families to build their own homes in remote areas. In 1951, the military relatives' village, which was built earlier, will be rebuilt, and part of the houses will be taken back by the Ministry of National Defence to be resettled by the former families and the soldiers who have families without families, while the other part will be sold by the state housing units to lower-income families. In 1980, the Labor House was opened, which also subsidized the interest on the purchase of residential loans. On the whole, the housing policy is still focused on subsidizing the interest of home purchase loans, but the scope of application has been greatly expanded. The housing subsidy has been extended beyond low-income households to cover all kinds of occupational status.
1995-1999	The active participation of the private sector in the construction of low-income housing began in 1994. In 1989 and 1990, housing prices soared and many people could not afford to buy houses. However, the government had limited capacity to build houses directly.
2000-2005	Housing policy after decades of development, almost all is given priority to with auxiliary purchase, minor, with preferential interest rates to borrow to buy the national folk construction of residence, use of financial institutions to lend money, but still not interest subsidies.
2005-now	Comprehensive housing policy the executive yuan for approval in the beginning of “the overall housing policy”, will be perfect Housing market and housing subsidies to improve housing quality, equity and efficiency are the objectives push hard of housing policy.

2.2. Public Housing and Social Housing in Taiwan

1) Origin and development

When Taiwan was hit by a cyclone in 1953, thousands of people were made homeless and temporary shelters began to appear. The next year, the Ministry of the Interior set up a technical team to build urban housing, which used U.S. aid funds to build national housing. The real impetus for the national house came from the influence of the wind and the problem of living without the house of the National Assembly delegates in 1954.

The purpose of national housing is to build on long-term, low-interest loans, mainly for laborers, farmers, fishermen, public officials, and citizens in general need of housing. Later, due to the lack of state housing funds to build a large

number of state housing, and the housing in the private market is expensive and in short supply, which makes it difficult for low-income people to get a good living environment, the state directly built national housing in 1975, and sold to low-income families. In 1982, the construction method increased the loan and the people's self-construction and the incentive investment construction, hoping to bring the people's capital into the country to reduce the burden of the country, and still strive to build a large number of national housing, to the volume of price system, to achieve the goal of housing for the residents. And behold, in 1987 real estate prices to float up, low price surge in housing demand, a serious shortage of housing supply, to increase the supply of public housing and assist low-income families solve the problem of living, turning to build low-income housing units by the executive yuan, and to avoid government-directed slow-moving or in short supply, and adopted the national housing presale system (2016, Zhang Shengwen).

2) The change of national housing policy

In 1989, in order to protest the unreasonable rise of housing prices, the public launched the "No Homes" movement. In order to curb the increase of real estate, the government launched a large-scale state housing project. At the same time, through the development of new towns and district expropriation, the housing policy is oriented towards the large-scale development of urban construction to deal with the national houses. At the time, the government directly and the construction are the main ones, but the policy begins to give more incentives to encourage the builders and the establishment of national houses. In addition, in the demand side also relax the conditions of the State House purchase, the State House policy toward liberalization. But because of the oversupply of national houses, the price is too high, so that the low income households cannot afford to buy, resulting in empty houses. Many, then with mortgage interest subsidy policy to replace the direct Canon building house. In 2000, the state housing policy shifted to absorb large surplus housing, and continued to stop rewarding private investment. In the case of the construction of national houses, the land purchased but not built shall not be reserved for construction, and in accordance with the provisions of the state-owned property law to change into non-public property, win air delivery by the state-owned property bureau to take over the follow-up disposal of jie sale. In 2002, the definition of national residence was expanded to include housing on the market when assisting people Curtilage fan, at this time the country house and the general residence is almost the same. It was eventually abolished in 2015.

2.3. Social housing

Social housing is derived from the urbanization process, the housing market supply and demand function of the occasional limit, resulting in low-income people cannot afford to trade good houses, and even cause social contradictions, resulting in many such as the political balance social issues, such as employment, education, environment, equity and public security, have been initiated through many social reforms. Social housing for rent, not for sale, is provided either at lower than the market rent price or for free by adopting the public sector's direct construction, subsidized construction or private-owned facilities suitable for the housing bridge. In order to solve the housing problem of the disadvantaged people, the social housing has become an important part of the national policy of "good housing". The first social housing project in Taiwan appeared in 2015. With the development of economy, the housing price in Taiwan rose rapidly. The high housing price made it difficult for the disadvantaged groups in the society, including low-income families, the elderly and the physically and mentally handicapped, to have enough income to buy houses. The government hoped to meet the housing needs of the disadvantaged groups through this kind of rent-free social housing. Present people's housing justice, and improve the use efficiency of empty houses.

Table 2. Public Housing and Social Housing in Taiwan (Developed by Author)

	public housing	social house
Year	1975-1999	Since 2005
Carry out	sell-out	Not for sale.
Modality build	The government builds and manages itself.	by BOT or landownership, entrusting the business author. Construction and management
Pattern	person who has / rented or has a spouse: myself, spouse, household In-line family members and spouses within the qualification status are: No. Owned by the Executive Yuan lower income household standards.	Low- and middle-income households, socially disadvantaged households and foreign residents Youth who attend school or employment, etc.

2.3. What is " the open building"

The theory of Guan Fang is originated from N. J. Habraken's De Draggers en De Menaen in 1961, which is different from the traditional theory of Guan Fang. It mainly criticizes and provides a new design concept for changing the method of industrial collective housing with mass production at that time. Guan Fang building theory is mainly divided into two-stage supply mode, which divides the building into long-term "Support System" and adjustable

"Infill System". through the participation of the users, to make the space sustainable development and flexible adjustment, so that the space is unified, and the space selectivity and uniqueness are generated through the users (Lin Lai-chu,2002).

1) Open Building in Taiwan

Taiwan real estate market prices since the 1960s, the government since the development of the market, also adopted. We need to intervene in the market in different ways to meet the needs of the people. From the early national housing, affordable housing, to today's social housing, all hope to provide affordable housing in the form of reducing part of the people. The burden of housing demand. However, in order to reduce the cost, the congregate housing is the most important residential style in the domestic metropolitan area, and it is also the mainstream product built by the developers at present. In recent years, the soaring housing prices have led to public issues (the promotion of public housing, social housing, affordable housing, etc.), changes in family structure (older age, fewer children, later marriage), and the importance of sustainable environmental protection, which have provided more space for thinking about the use of housing behavior. Through this study, it can be seen that there is a great difference between the traditional construction production process and the step-by-step and variable production process advocated by the closed construction. While promoting open architecture as a policy public housing.

2) Simulate Housing Design for All-Age

Under the impact of aging and high housing prices in Taiwan, the demand for changes in residential space has increased due to the need for long-term use. Consequently, this research is based on support and infill separation system and two-stage construction by the open building theory. Hereafter, the concept of a barrier-free environment and universal design are combined as the theoretical basis for design operations. (Hsin- An Chen、Huang-Liang Li,2019).

Table 3. A summary table of the minimum space size of each residential unit scale (two to four room types) suitable for the healthy period, the obstacle period, and the bedridden period.

		Suggested value	Healthy period	Obstacle period	Bedridden period
Two room type	Wide type	X*Y	750cm*680cm	910cm*830cm	1070cm*705cm
		Indoor area	51 m ²	76 m ² (75.53)	76 m ² (75.4)
	Deep type	X*Y	610cm*800cm	740cm*960cm	700cm*980cm
		Indoor area	49 m ² (48.8)	72 m ² (71.04)	72 m ² (71.04)
Three room type	Wide type	X*Y	860cm*730cm	1050cm*910cm	1050cm*980
		Indoor area	63 m ² (62.78)	96 m ² (95.5)	96 m ² (95.5)
	Deep type	X*Y	720cm*870cm	900cm*1080cm	845cm*1355cm
		Indoor area	63 m ² (62.64)	98 m ² (97.2)	96 m ² (95.9)
Four room type	Wide type	X*Y	890cm*870cm	1200cm*990cm	1200cm*1035cm
		Indoor area	78 m ² (77.43)	119 m ² (118.8)	119 m ² (118.8)
	Deep type	X*Y	790cm*970cm	940cm*1180cm	930cm*1180cm
		Indoor area	77 m ² (76.63)	111 m ² (110.9)	111 m ² (110.2)

Note: Although all the above values have the exact values of the derived calculation results (values in brackets); Only in the application of architectural design, the scale of X-axis Ya axis takes 5 cm as the module moment unit, and the scale of indoor area takes integral value as the module moment unit.

3. Research Methods

Through documentary evidence, it has been discovered that in the process of moving from garden to social housing in Taiwan, the price of medical treatment is too high. Many low-income households and disadvantaged households remain unable to afford house prices, causing empty space and inaccuracy the basic residence rights of the people. In addition, lower than the convenience rate, lower median rate and higher return rate may be used for the purpose of reducing the tax liability of the Cases that can be reduced to private property and repeatedly manipulated have arisen. In addition, when the Housing Ordinance stipulates that there is only one section, the Government will distribution improvement effect, but it is a one-off effect and has no effect at all. Under the "rent-only-for-sell" system, on the one hand, housing will not be relegated to the same status as social housing. On the one hand, speculation provides basic housing protection for those who cannot afford higher housing prices.

3.1. Scope of Study

Chiayi City, the earliest built city in Taiwan, became a Taiwanese during the Japanese occupation. the second-highest population density in the city · Government housing development in order to solve the problem of residential development., Moreover, the state-owned houses were sold at one time, and after the development of the city, the house prices were raised repeatedly. In recent years, the population has also been affected. The elderly and the old

houses are no longer able to provide good living conditions for the residents. As a result, the rate of vacant housing in the state housing community has been increasing year by year, and the majority of the elderly have remained. In the city. In the process, the high housing prices, the high vacancy rate and the aging of state-owned housing communities forced the government to face up to the problems. This study aimed at renovating public housing in a non-destructive manner exploratory Study on Housing.

Table 4. Public housing in Chiayi (Developed by Author)

No	Name	Original use	Building style	Situation
1	Duxing Village	Army Military Village	The building has been changed to be a collective housing.	It was merged into Jingguo New City in 1994, and the original site is now a residential area.
2	Dongchuan New Town	Army Military Village	The building has been changed to be a collective housing.	It was merged into Jingguo New Town in 1994, and the original site is now a high-end residential area.
3	Jingzhong First Town	Army Military Village	The building has been changed to be a collective housing.	It has been moved into the Jingzhong New City Building on Linsen East Road, and the original site is now an open space.
4	Fuguo Town	Army Military Village	The building has been changed to be a collective housing.	It has been incorporated into the Fuguo New City Building on Anle Street
5	Jiashui New Village	Tax Office Dormitory	All two floors Red brick buildings, cement streets are built in the community, arranged in a □ shape.	There are still 27 households.
6	Jiahui Second Village	Tax Office Dormitory	All are red brick second-story houses, the community is arranged in a two-by-three chessboard	There are still 60 households.
7	Yushan First and Second Village	Staff dormitory of Yushan Meteorological Bureau in Chiayi	Red brick second-story houses.	There are about six or seven households in Yushan No. 1 Village, and only one household in Yushan No. 2 Village. Most of the rest are under demolition.
8	Haipu New Village	Taiwan Sugar Staff Dormitory	There are more than 20 households, mostly four or five-story buildings with yellow appearance.	There are still 20 households in a lane on the east side of the Chiayi Christian Hospital.
9	Guoguang Town	CNPC Dormitory	Old houses on the first and second floors.	Located on Xuanxin Street, there are three or four streets and no fewer than 100 households.
10	Renhe Town	CNPC Dormitory	Two-story building with a management room.	There are still 10 households.
11	Gongcheng New Village	CNPC Dormitory	One floor wooden building.	There are a community.
12	Yule New Village	Kuomintang Party Department Dormitory	The scale of two streets and lanes has been renewed as a mixed land for residential and commercial using.	Located next to Chiayi Park, there are about 20 to 30 households mixed with old and new houses.
13	Renyi New Village	The original residents of Renyi Reservoir	U-shaped arrangement Columns, mostly green apartments on the fourth and fifth floors.	There are nearly 60 households, located in Nicebai.
14	Jiagong Village	Teacher's Family Dormitory	One floor old house.	There are two households living.
15	Jiazhong Village	Teacher's Family Dormitory	The second floor brick house.	Surviving.
16	Jia Nu Village	Teacher's Family Dormitory	The second floor brick house.	Only about seven households
17	Jiājing Village	Teacher's Family Dormitory	One floor old house.	There are more than ten households, and most of them are dilapidated.
18	Jianong Village	Teacher's Family Dormitory	One floor old house.	It still exists and is very ruined, but it is planned to be demolished.

3.2 Research Analysis

(1) Economic and digitization of socially disadvantaged families. Through Government Organisation of Vulnerable Organisations Family Housing Demand Survey and General Public Interest investigation as a system. Social Welfare and Housing service policy, and was introduced in 1900 to the Legislative Public Housing Requirements for the Year 2000. According to the report, At the end of March, 100, the six types of economy in our country or a social family. Including low- income households, middle-income households, Low-income physically and mentally handicapped families, middle-income elderly Single-parent families with Underage Children 3 Families over 18-25 years of age who

have left the post Family support and re-housing facilities 6 categories, including adolescents, The total number of households was 973, 790. Stratified by Urbanization Levels throughout the country. Afterwards, six categories of economic or the total number of socially disadvantaged families without own homes is 394,715 households (with no owner's. Residential rate 40.5%) According to the survey, the majority of disadvantaged households are: non-governmental planning and construction. Rent-only society Club house with 88.4% showing 50.5% indicates extraordinary 37.8%.

Table 5. Economic and digitization of socially disadvantaged families

Target	The disadvantaged who cannot get housing in the market	The family have more children	Common elderly	Residents who live near the construction site and, needs rental.	Common family
Disadvantaged family	59.63	41.89	28.62	27.90	26.71
Low-income households	51.95	36.25	34.43	18.05	24.96
Low- and middle-income families with disabilities	44.60	32.33	32.69	17.72	25.04
Low-income elderly families	37.31	30.79	35.97	19.77	22.19
Single-parent families	72.05	42.35	25.17	37.01	28.24
Have 3 minor children	65.68	76.43	19.16	32.47	29.67

(2) The burden of housing loans increases year by year

According to the website of the Planning and Development Department of the Ministry of Home Affairs and development, prices negative income than Yoshi Koshima (Park 2) and national loans. Carrying ratio exceeded potential (Park 3), house price income ratio middle median annual disposable income of a single-digit house years of disposable income. The higher the total purchase price of a median house, the higher the value. The lower the affordability of the house, the lower the rate of delivery. Monthly amortization / home ownership of total residential mortgage loans median disposable income of household month mark of total residential value ratio of median disposable monthly income The larger the case, the lower the negative housing price ability. You can see that the ratio of the national income from housing leave to the national loan The burden rate is rising year by year, which represents the buying of houses by the people. The affordability of houses has also declined year by year.

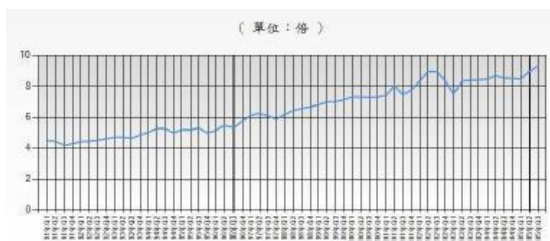


Figure 2. The trend of national housing price income ratio

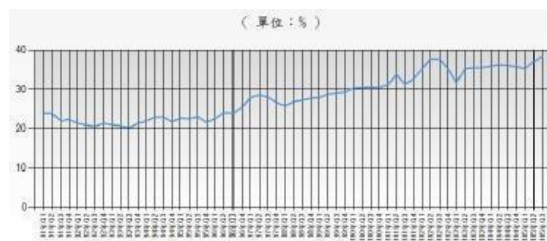


Figure 3. National loan burden rate trends

(3) Empty Housing Rate

According to the executive yuan master plan place of population and housing census in 99, Taiwan people round 99 unmanned often in poor and not idle house for other purposes, including for rent, for sale, sold, or rented, there is no people often often curtilage in, there are 2 edges on attack often live in a house, because of work reasons such as live elsewhere and not often in residential houses, 156 meter high curtilage, accounted for 19.3% represents the rate of empty homes Was 19.3%, an increase of 1.7 percentage points over 17.6% in 1989.

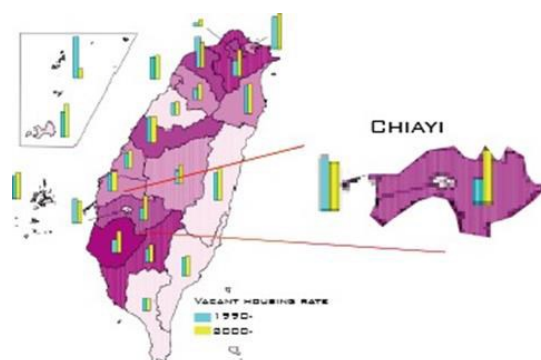


Figure 4. Vacant housing rate in Chiayi (Developed by Author)

(4) Analysis of social housing supply and demand

As shown in the figure, there will be no generalized rent subsidy type of social housing in Taipei. A total of 8,921 dwellings were constructed in Xinbei City, Kaohsiung City, Taotutu City, and Shiyi City. Based on the selection of 8,601,774 dwellings in the 3rd Li Yuan in 105 years, social dwellings accounted for 0.103% of the total number of good dwellings in Taiwan.

Table 6. Current supply quantity in Taiwan

Area	Project	Quantity (household)	Subtotal
Taipei	(5 places)	842	6,872 (households) accounted for 0.726% of the total residential housing in Taipei City.
	Public housing (6 places)	274	
	Rent Public housing (20 places)	3531	
	Relay house (2 places)	365	
	Affordable housing (4 places)	1407	
	Women's Halfway House (1 places)	77	
	Senior Housing/ Apartment (4 places)	376	
New Taipei City	Yonghe Youth Community	11	1478 (households) accounted for 0.093% of the total residential housing in New Taipei City.
	Xindian Zhongzheng Pulic Rental Public Housing	56	
	Xizhi Huadong New Village Temporary Resettlement Housing	126	
	Sanxia Cultural Tribe	146	
	Wugu Elderly Park	71	
	Sanchong youth communities (Datong)	119	
	Sanchong youth communities (Da'an)	133	
	Zhonghe Youth Social Housing	816	
Kaohsiung	Aboriginal rental housing	13	313 (households) accounted for 0.029% of the total residential housing in Kaohsiung.
	Labor rent community	174	
	Single parent home	65	
	Silver Home	6	
	Fengshan Wujia Taipower Community	55	
Taoyuan	A7 MRT convenient residence	225	225 (households) accounted for 0.027% of the total residential housing in Taoyuan City
Chiayi	Chiayi Evergreen Community	33	33 (households) accounted for 0.032% of the total residential housing in Chiayi City.
Taiwan	Total: 8921 (households) accounted for 0.103% of the total residential housing in Taiwan.		

According to article 4 of the housing law, according to the research case conducted by the land and real estate information center entrusted by the statistics department of the ministry of the interior, there are 12 categories of suitable objects for social housing, and the potential demand for good social housing is estimated as 8,042,061 households, accounting for 12.07% of the total housing stock. According to the estimated amount, the imbalance between supply and demand of social housing is far greater than the current supply. Discussion on renewal adaptability of building and national residence.

4. Discussion on the Adaptability of public housing renewal

In recent years, the problem of single spatial form, vacant housing and aging in Chiayi's community has become increasingly obvious. The government has successively rebuilt new-style collective housing on the original site or relocated to more suburban areas to give the original residents the priority to purchase in the form of subsidies, but the updated Due to the high cost of construction, the collective housing was sold at a lower price, attracting many

people to buy houses and speculate. The government renewal was originally to improve the quality of life of residents, but today's high mortgages and rents have not achieved substantial benefits. This research will analyze and study the concrete residential buildings older than 30 years, and use the open building theory to decompose the national buildings into brackets and fillers. Without dismantling, the original living space frame will be retained to update and enhance the space. The adaptability.

Renew the old residential houses through the open architecture theory to reduce the cost of renewing them into houses, and minimize the private space through shared areas, thereby creating added value for all residents, developing cost-effective social housing, and for continuous growth Nomadic groups in the target city create various and comfortable living conditions.

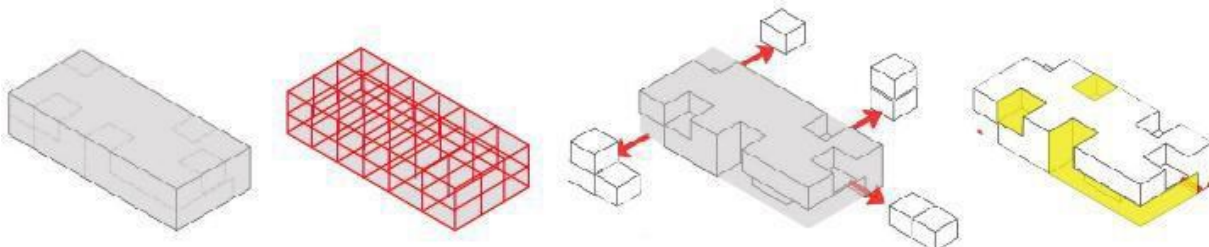


Figure 4. Discussion on the Adaptability of public housing renewal (Developed by Author)

5 Conclusion

Based on the concept of open building, this research proposes the renewal and design of the public housing in Chiayi, Taiwan. The main structure of the old building is retained in a non-demolition and reconstruction mode, and the open building method is used to rethink how to achieve a space that meets the planning of different life cycles. In the process of change, a friendly and healthy living environment can be implemented. The study also collected case samples to learn about the needs of various types of collective residential units at home and abroad, and increase the adjustability and response methods of space composition. It also proposes how to update the existing public housing to a modern and aging space plan to achieve the development process in the city. The residential space can also be partially improved using the open building model, so that the living space can adapt to all ages. The need for transformation.

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Conflict of Interests

The authors declare no conflict of interest.

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