Research on the reconstruction of old residential quarters based on the concept of sustainable development

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Abstract. According to the problem of sustainable development after the reconstruction of old residential quarters, this paper analyses the community cases of Electric Power Design Institute in Wuhan and Jinsong community in Beijing. Then, through the investigation of the reconstruction of them, the paper summarizes sustainable development community design mode, and extracts the key factors affecting the sustainable development of the reconstruction, so as to provide sustainable reference for the follow-up guidance of more reasonable reconstruction and design of old residential quarters, and to improve the urban renewal.

1. Introduction
In recent years, the contrast between the newly-built houses and old residential quarters is increasing day by day. China has carried out a lot of reconstructed projects for the old residential quarters. However, there are still many problems in the renewal of those areas. Due to the complexity and diversity of the reconstruction contents, there is no corresponding evaluation and acceptance standard currently. And the old residential areas after renewal also require certain management today.

2. The sustainable development in the reconstruction of old residential quarters
The old residential quarters refer to the area where built before 2000 in the city and county, and the public facilities are backward, which affects the basic life of residents and they have strong desire to reform. The old residential reconstruction in China, while foreign studies prefer to use the term of residential regeneration and emphasize the concept of sustainable development of community.

2.1. The sustainable development of old residential area
The sustainable development of the old residential area reduces the investment in the construction work, prolongs the service cycle of the building, and gives full play to the maximum use value and economic value of the building. In addition, the reconstruction of old residential areas also reduces the environmental pollution and waste of resources caused by the demolition and reconstruction of buildings. The reconstruction of old residential areas is actually the individual implementation point of urban renewal.

2.2. Urban renewal in the West
Western urban renewal began after World War II, and a series of measures were taken to solve the declining situation in urban areas. With the development of the times, a trend has formed from the demolition of dilapidated buildings to multi-dimensional community renaissance, which emphasizes the sustainable development of harmony and balance of nature, economy and society.
2.3. Urban renewal in China
Compared with the west, the research on urban renewal in China is a late starter. Although urban renewal has gradually become a hot topic in academic circles, but prevenient urban renewal prefers to estate-oriented which focuses on material space. In recent years, Chinese urban renewal has gradually begun to pay attention to historical and cultural and social issues. [5]

3. The mode of old community reconstruction in China
At present, the reconstruction mode of old residential areas in China is mainly from top to bottom, the mode is dominated and funded by the government; Beijing and Shanghai have gradually emerged a bottom-up mode of introducing social capital based on residents' wishes.

3.1. Top-down reconstruction mode

In the book "modern urban design theory and method", Wang Jianguo thinks that the "top-down" design mode is mainly based on human force, which is a method to design and build cities and towns according to the anticipating and ideal patterns of a certain class or even an individual. [6]

The community of Wuhan Electric Power Design Institute has been reconstruction in 2019. There are 29 staff houses with 1566 households, and the government spend around 7500 RMB per household to reconstruct it. The questionnaires in the Figure 1&2 show that most of the residents did not participate in the renovation of the residential area, even they felt that their life had not been greatly improved. Some residents felt that the reconstruction had destroyed their previous living habits. The survey shows that the residents' experience after reconstruction is not as good as before.

3.2. Bottom – top reconstruction mode
The "bottom-up" reconstruction design method is contrary to the "top-down" reconstruction design method. The "bottom-up" design emphasizes a kind of "natural force" or "objective force", which is deposited from the needs and wishes of each individual in the region under the principle of organism
growth. It is characterized by reasonable function, self-sufficiency and adaptability to economic and regional conditions.\[6\]

Beijing Jinsong residential renovation won the excellent case of China's urban existing building renewal in 2019, known as "Jinsong mode", as shown in Figure 3. The reconstruction adopts the "five party linkage" mechanism of "district level overall planning, neighbourhood committee, community coordination, residents' discussion and enterprise operation", which is led by district level departments, and linked by District Committee Office, sub district office, neighbourhood committee, social units and enterprise representatives to jointly promote the comprehensive improvement of community. \[7\]

Figure 3. "Jinsong mode"--Five party linkage mode

Through dozens of interviews with residents and in-depth communication with residents, the project team came to the conclusion that community residents urgently want to be improve. On the basis of retaining the original functions, the community has added some new functions. The ingenious design not only increases the vitality of the community, but also maintains the residents' living habits for many years. New functions are added quietly, making the residents' life more convenient and richer. The introduction of vision property services and upgrading the idle and inefficient space in the community achieve the balance of investment return within a certain period of time, so as to form the interest incentive point for market forces to participate in the organic renewal of old urban communities.

4. Sustainable development community design mode

In order to realize the sustainable development of the old residential reconstruction, its goal is to design and build a way of life, which can significantly improve the quality of life of the owners and effectively improve the natural environment of the community. Life and death in American big cities point out that "in cities, we need all kinds of diversity, so that urban life can enter into a benign and constructive operation, and people in cities can maintain (and further promote) the process of social and temperature sensitivity."\[8\] Therefore, the sustainable old community reconstruction can be designed from the following aspects.

4.1. Increase community diversity

The problem that we need to solve urgently is, what kind of reconstruction method can make the community keep vitality and sustainable development? For the reconstructed community of Wuhan Electric Power Design Institute, more than 3000 households were surveyed to understand the conditions for continuous renewal of "bottom-up" communities. The old community has its own advantages and disadvantages. In the process of reconstruction, it is necessary to strengthen the advantages, such as the geographical location, neighbourhood relationship and traffic, and discuss with residents about improvement.
4.1.1. Find main problems

Table 1. Main problems of community development (Unit: 1000 persons)

At the beginning of reconstruction, dozens of interviews and in-depth communication with residents should be promoted to find the main problems. For example, among the main problems of community development in Wuhan Electric Power Design Institute, the problems of management mechanism and community environment urgently need to be initially addressed. However, the actual renovation of these two aspects is little.

4.1.2. Environmental diversity

Table 2. Demand for Reconstruction (Unit: 1000 persons)

Old reconstruction mode often ignores public needs and makes them participate passively. From the perspective of user needs, the diversity of the environment should be maintained, so to mobilize the enthusiasm of people to build a home together. In the community of Wuhan Electric Power Design Institute, on the demand of the reconstruction, estate management and public service facilities need to be improved the most.

4.1.3. Service facilities

Table 3. Demand for service facilities (Unit: 1000 persons)

The supporting service of the community is the most concerned problem of the residents. Now the government is actively planning a 15-minute walking life circle, so as to maintain the vitality of the old community in the centre of the city. Regarding the demand for service facilities, educational facilities are in urgent need of improvement.
4.2. Community assessment for sustainable development

In summary, the sustainable development of community can solve the problems from following clauses: the position, reconstruction and design, use and regeneration.

| Characteristics of residence | Sustainable development of housing                  |
|-----------------------------|-----------------------------------------------------|
| position                    | •Sustainable land use planning                       |
|                             | 15 minutes life circle improvement (life, medical care, |
|                             | education, etc.)                                    |
|                             | Close to good public transport                      |
| reconstruction and design   | •Sustainable construction                           |
|                             | •Sustainable use design                             |
|                             | •Housing quality                                    |
|                             | •Green environment                                 |
|                             | •Attractive, clean and safe living environment      |
|                             | •Neighborhood relationship                         |
|                             | •Service facilities                                 |
| use                         | •High standard energy efficiency in residential use |
|                             | •Waste recovery                                     |
|                             | •Sustainable management and maintenance             |
| regenerate                  | •All of the above&                                  |
|                             | •Emphasis on Retrofitting rather than demolition    |
|                             | •working with households                           |

5. Conclusion

At present, in China, the "bottom-up" reconstruction mode is not mature enough.\cite{9} There is a lack of effective communication channels among the government, enterprises and residents, which brings the result that the products under the "top-down" reconstruction mode sometimes can hardly achieve the desired state of residents, and the "bottom-up" mode is difficult to be carried out due to the lack of support from government and enterprises. If the two modes can be combined organically, the urban renewal will be more sustainable.

5.1. Macro level: the government presides over the top-down 15-minute life circle planning

At the macro level, the government has huge resources that can be directly allocated, including urban public goods such as a large number of dilapidated houses, public service facilities and infrastructure.\cite{10} If the government can base itself on the public interests of the city, play the role of supervision and coordination behind the scenes, and reasonably plan the supporting public service facilities and infrastructure within the 15-minute living circle of the old residential quarters, and then, introduce experienced developers to carry out the design reconstruction, and combined with the needs of residents, so that the transformed residential area can better adapt to the needs of economic development and people's livelihood.

5.2. micro level: bottom up Residents Autonomy presided over by the neighborhood committee

At the micro level, neighbourhood committees should build a bridge of communication between government, enterprise and residents, which can promote effective communication and exchange between government, enterprise and residents, and enable residents to support and cooperate with the work of government and enterprises more effectively. At the same time, the government and enterprises can better understand the residents' willingness and needs.

5.3. Social level: Investment operation of social capital

At present, after the completion of the reconstruction of the old community, due to the lack of effective management, it has returned to the previous state for a long time. At present, the property
management regulations of Beijing clearly state that "support social capital to participate in comprehensive renovation and property management of old residential areas", so that social capital can obtain direct economic benefits after reconstruction, which will be the guarantee of sustainable development.

5.4. **Design level: comprehensive operation considering the interests of all parties**

In terms of design, while taking into account people's cultural feelings, the characteristics of urban culture and the continuation of historical context should also be taken into account. Avoiding drastic reconstruction, and preserving, activating and regenerating the old city so as to make the urban renewal sustainable.

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