A Methodological Exploration of Converting Residences into Residential Care Facilities for the Elderly in Old Communities
— A Case Study of Chaoyang District, Beijing

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Abstract

With community elderly care facilities as the breakthrough point, this paper is based on the field of old community research and model analysis, taking the related residence conversion methods as a philosophical basis and reference, and tentatively proposes optimal residence conversion methods and key points of design in aging old communities.

Keywords: residential care facility for the elderly; old community; converting residence; small-scale

Research Background and Significance

There is a large senior population who live in old communities in Beijing with an urgent need for elderly care facilities. However, the lack of elderly care facilities in the old community makes it difficult to support home care in the current situation. Due to the fact that the area of the old community is limited, it is impossible to build a new type of intensive and large-scale nursing institution for the elderly. On the other hand, there are a lot of vacant residences in the old community residential area. If these vacant spaces are converted into small-scale elderly care facilities through spatial integration, it would be an effective way to solve the problem of the aging society for future community development in China. From the perspective of resource conservation, it is also a reuse of resources; and at the same time, is a way of maintaining a sustainable living environment for the elderly without cutting off the connection and relationship with other people. At present, however, the practice and research on residential conversion into small-scale elderly care facilities is still relatively rare. So, there is an urgent need for academic research and practical exploration for special cases. Based on the arguments above, this paper tries to put forward new ideas and methods of modification suitable for old communities, by exploring the conversion of existing residences into community Residential Care Facilities for the Elderly (RCFE).

1. The Present Situation of the Old Community and Elderly Care Facilities in Beijing
1.1 Present Situation of the Old Community
(1) The Quantity of Old Communities is Large
In this paper, the term old community refers to the residential area funded by the government and state-run companies prior to housing reform. Compared with the residential area built after the commercial housing reform in 1998, most old communities faced more difficulties in dealing with the management of urban infrastructure and community facilities. According to the national statistics, the number of old communities, located in the central district of Beijing (Dongcheng District, Xicheng District, Haidian District, Chaoyang District, Shijingshan District and Fengtai District) is about 1,930. Among them, the number of old communities built during the 1980s is about 200, which is approximately 10.4% of the total. The number of old communities built during the 1990s are about 650, 33.9% of the total. Most of the old communities in the central districts of Beijing were built in the 1980s and 1990s, about 44.3% of the total communities. This shows clearly that there are a large number of old-fashioned communities in Beijing.

(2) The Quantity of Old Urban Communities in the Central City is Large
According to statistics of the "Information on the Aging Population and the Development of the Aged of Beijing in 2014", by the end of 2014, the number of the senior population aged 60 and over was 1.96 million in the central districts of Beijing, about 66.16%
of the total population of the city's elderly people. The number of the senior population aged 80 and over was 389,000 inhabitants (13.1% of the total population).

1.2 Current Situation of Community Elderly Care Facilities

(1) The Type of Elderly Care Facilities is Single in the Old Community

According to China's national standard "Building Design Specifications of Elderly Care Facilities GB50867-2013"\(^4\), the elderly care facility is a building of special or comprehensive services for the elderly to provide living, life care, health care, culture and entertainment, etc., which includes elderly care homes, nursing homes, elderly day care centers, nursing centers, etc. In China, most of the communities are equipped with elderly activities centers, basic health clinics and other related service facilities. However, construction for the elderly living in daily care facilities (day care and night care) in old communities is still in its infancy. Therefore, for old communities, the intensity and coverage of elderly care services are limited and it is hard to meet the needs of the elderly in the community.

(2) The Number of Community Elderly Care Facilities is Small and the Number of Nursing Beds is Insufficient

As of the end of 2014, the number of nursing homes in Beijing was 410, the nursing beds were about 109 thousand, and the number of beds in day care facilities reached 18 thousand. According to the "9064" elder-care initiative proposed by the Beijing Municipal Government, 6% of elderly people need to be cared for in community care facilities and 4% cared for in social institutions, that is to say, 178,000 senior people need to stay in community care facilities and 119,000 in social institutions\(^5\). It is obvious that the number of facilities and the number of nursing beds are seriously inadequate in the community, and that it is unable to meet the needs of the elderly who require care services in the community area. On the other hand, the elderly care facilities are not evenly distributed in Beijing and the data shows that the capacity of nursing beds does not match the size of the elderly population. According to the statistics of the Beijing Elderly Care Industry Development Report in 2015, there are a total of 320 elderly care institutions outside of the Fifth Ring Road, and the number of nursing beds is 79,000, accounting for 83.4% of the total elderly care institutions in Beijing; while within the Fifth Ring Road, which is the center of Beijing, the number of elderly care institutions is 90 and the number with nursing beds is 30,000, accounting for only 16.6% of the whole city. In view of the distribution of the elderly population, the elderly people in the central districts of the city are far from satisfied with the number of nursing beds (Fig.1.).

Table 1. Summary of Community Situation

| Name          | Number | Construction Time | Area | Population | Age over 60 |
|---------------|--------|------------------|------|------------|-------------|
| Huawei North  | A01    | 1970s            | 40ha | 12000      | 3480        |
| Yanjing North | A02    | 1970s            | 22ha | 14600      | 3500        |
| Tuanjiehu North | A04  | 1970s            | 28ha | 11500      | 3100        |
| Mofang North  | A05    | 1980s            | 35ha | 9382       | 2815        |
| Nongguangling | A08    | 1980s            | 15ha | 9200       | 2610        |
The survey is divided into two parts: (1) Survey of community elderly care facilities; (2) survey of residences. During surveys, the authors recorded in detail the service facilities and elderly care facilities which are closely related to the life of the elderly in various communities, including health care facilities (community health service stations, clinics, pharmacies, Chinese medicine care, massage care), life service facilities (restaurant for the aged, laundry, housekeeping, hairdressing, supermarket), leisure facilities (activity center, activity station) and elderly care facilities (day care, nursing homes, apartments for the aged) and so on.

This article focuses on the analysis of service facilities in communities A02 and A04. Through the statistical data, the authors found that elderly care facilities showed an imbalance between different types of service facilities. Fig.2. shows that the number of living services and business services is the largest, accounting for 80% of the total number of facilities in the community, while the quantity of facilities for the elderly, such as medical facilities and day care facilities, is small.

Table 2. Distribution and Quantitative Research of Elderly Care Facilities in Various Communities

| Name                  | Yanjing West (A02) | Tuanjieh North (A04) |
|-----------------------|--------------------|----------------------|
| Community Area        | 22ha               | 28ha                 |
| Construction Time     | 1970s              | 1970s                |
| Proportion of the Elderly | 24%               | 27%                  |

2.2 Demands of the Elderly in Old Communities

From the service demands for elderly statistics in communities, we can see that the facilities which the elderly mostly wish to increase are elderly activities stations, restaurants for the aged, elderly counseling centers, day care centers and nursing homes (Fig.3.). However, these types of elderly care facilities are in short supply inside the community area, which cannot meet the basic needs for elderly care in the old community area (Fig.4.).

Fig.2. Comparison and Analysis on the Quantity Distribution of Community Elderly Care Facilities

Fig.3. Analysis of the Elderly Demands for Service Facilities

Fig.4. A Comparative Analysis of Community Elderly Care Facilities and Demands

2.3 Situation Concerning Residence in Old Communities

Residential adaptive conversion is based on the full study of existing residential space on the basis of the original mode of residential space. The floor plan and size of the original residence have a strong effect on the function and layout of an elderly care facility, which is converted from a residence. In order
to further analyze the status of the existing residence in old communities in Beijing, the authors selected some typical residential buildings in communities A08, A01 and A05 as samples to conduct an in-depth analysis of the users' basic situation, floor plan and the conversion possibilities of residential buildings. Then the authors classified the area, space combination, function and other contents of the residence (Fig. 5).

| Name             | Nong Guang Li (A08) | Huawei North (A01) |
|------------------|---------------------|--------------------|
| Community Area   | 15ha                | 40ha               |
| Construction Time| 1980s               | 1970s              |
| Proportion of the Elderly | 28.4% | 29% |

Diagram of Residence types in the Old Community

The Proportion of Different Types of Dwellings in the Old Community

According to the relevant research and community survey, the authors summarized the residence building types of the old communities in Beijing during the 1970s and 1990s. From the residential structural point of view, during the 1970s and 1990s, the existing residence was mainly constructed of brick and concrete, prefabricated plate structure and a frame shear wall. Brick and concrete structural residence buildings have no more than six floors without an elevator. From the point of view of unit layer plane composition, it can be divided into five types: one floor for two households, one floor for three (four) households, one floor for more households, inner corridor and corridor. From the point of view of quantitative analysis, one floor consists of three households, and one floor of more households accounts for almost half of the older communities, while the internal corridor-style residences are also common. These different types of residences can provide an enriched conversion method and content for the RCFE (Fig. 6).

2.4 The Feasibility of Residence Conversion into RCFE

In summary, the basis of residence conversion and feasibilities can be concluded as follows:

(1) National Policy Orientation

At present, the elderly care policy in China is mainly focused on small-scale, multi-functional elderly care facilities. It is highly recommended to make full use of existing resources for the construction of elderly care facilities through replacement, withdrawal, conversion, etc. The government encourages private enterprises to take part in the construction of elderly care facilities, reduces the access threshold, and subsidizes nursing beds for the elderly. Communities with elderly care facilities as core services have gradually become the trend of elderly care development.

(2) Residence Conversion with an Emotional Family Sustenance

As RCFE converted from existing residences are not much different from the originals, the elderly do not need to take a long time to adapt to the new environment. In the meantime, the RCFE does not cut off the elderly's contacts with their old neighbors, which is conducive to the establishment of a sense of belonging and realizing the "non-institutionalization" of elderly care facilities.

(3) Saving Costs and Land Resources

RCFE, converted from existing residences, are achieved mainly on the internal space adjustment of
the residence, or through addition, merging and other methods. Private enterprises or individuals can put the service in use quickly and efficiently after conversion, saving costs and land resources. This is also a way to revive idle resources.

3. Research on the Type and Method of Residence Conversion into RCFE

Based on the above research on the status of elderly care facilities and the most pressing needs of elderly in old communities, considering the basic conditions such as the scale, the population of old people and the type of houses in old communities, the authors will summarize the RCFE in old communities into three types, which are day care RCFE, nursing care RCFE and multifunctional RCFE, as well as making an exploration of the ways to convert various types of RCFEs. The following is a breakdown of these three types.

3.1 Day-care RCFE in Old Communities

(1) Service Group and Content

A Day-care RCFE helps to serve the elderly who need care services and those who cannot live by themselves, but do not need sustained medical care. The service groups include the elderly who are living alone, seniors and semi-disabled. The service contents of Day-care RCFE are mainly for day care services, catering services, personal care, entertainment and other content, and provide morning and evening pick-up. The elderly go to Day-care RCFE for day care and nursing services during the daytime and participate in various activities for the elderly. After that, they return to their original house for rest at night. This kind of RCFE can continue to maintain home-based care for the elderly and enable them to regain their ability to take care of themselves and delay their stay in the social elderly care institutions through Day-care RCFE.

(2) Type of Residence Suitable for Conversion to Day-care RCFE

Among households, the ones that are more suitable for conversion to Day-care RCFE are the residences of a floor for two, one floor for three and one floor for more households. If the elderly care facility is small and the housing area is large, it can be designed through single-family conversion or part conversion of the dwelling houses, and the rest of the space will continue to be used as a dwelling; otherwise, they may be designed through other conversion methods.

(3) Conversion Methods

The conversion method is based on the original residential units. For example, through the functional replacement method, we can convert the bedroom to a Day-care RCFE with added service function or build additional space in front of the house as a service room. We can also merge two original residential households into a larger Day-care RCFE. As shown in Fig.7., depending on the gross floor area of the original home, a Day-care RCFE should not be oversized and can be distributed in large numbers and flexibly in any corner of the community, with the accessibility and diversity of services.

3.2 Nursing-care RCFE in Old Communities

(1) Service Group and Content

A Nursing-care RCFE can provide daily care, night accommodation and other services for the elderly, short stay is generally 3-5 days and long stay up to several months. The elderly people return to their homes after they have recovered from rehabilitation and care in a Nursing-care RCFE in old communities. Therefore, the elderly still stay in their familiar environment without cutting off the connection with other people during the cyclical process.

Nursing-care facilities serve the elderly who are semi-self-care, disabled and those who need rehabilitation care.
(2) Type of Residence Suitable for Conversion to Nursing-care RCFE

Residences of one floor for three households, one floor for more households or corridor/corridor are suitable for conversion into Nursing-care RCFE, which require more spaces for multi-functions including living, nursing, activities etc.

(3) Conversion Methods

| Original Residence | Add a Functional Space Between Two Residential Buildings |
|--------------------|--------------------------------------------------------|
|                    | ![Diagram](image1)                                    |
| Replacement and Merging a Floor | Add a Functional Space at the bottom of the Residential Building |
|                    | ![Diagram](image2)                                    |
| Merge into One Unit |                                                       |

| Original residence won’t be affected |
|--------------------------------------|
| ![Diagram](image3)                   |
| Horizontal merging                    |
| Single space replacement             |
| Multi-space replacement              |
| Space-reorganization method           |

Fig.8. Conversion Methods for Nursing-care RCFE

Due to the specialties and complex functions of Nursing-care RCFE, we need to take sizes, floor plans and structures of the existing residences into consideration during the conversion process. For example, a larger area may be added between two residential buildings, or two or more of the original households in the same floor may be merged into a larger unit as shown in Fig.8. According to the original households' area, the area of Nursing-care RCFE should not be too small. Also, it can be built at a convenient place for traffic or at the center of the old community.

3.3 Multifunctional RCFE in Old Communities

It is also possible to create a mixed community-based elderly care facility, which is a Multifunctional RCFE with a combination of Day care RCFE and Nursing care RCFE. Functions include both daily care, activities and other services, while professional nursing, night accommodation and other functions are also available.

For example, between two residential buildings in an old community, one household or an entire floor of a residential building may be converted into a Nursing-care RCFE. And combined with Day-care RCFE, a Multifunctional RCFE is formed for nursing care, day care, short-term residence, visits and other comprehensive demands. Through the overhead and bottom, a Day-care RCFE may be connected to the second or the third floor of two buildings. The road and the green space in the old community could be retained at the bottom of the Day-care RCFE with their original functions unchanged.

On the other hand, the Day-care RCFE and the Nursing-care RCFE can be connected with each other in an effective way and form a circular route. The elderly could walk around this route for indoor activities without going outside. This conversion method can improve the nursing service quality of the Multifunctional RCFE as it takes advantage of a mixed space combination in an economical and efficient way (Fig.9.).

Fig.9. Conversion Methods for Multifunctional RCFE
3.4 Method of Converting a Residence into an RCFE in Old Communities in China

Japanese scholar Shuichi Matsumura wrote a book named *Residence Regeneration - Rejuvenate the new collection of European and American Homes*, He combined the theory of residence regeneration and advanced concept and technical methods applied in community renewal and residence conversion in European countries and the United States through a large number of researches and analyses, then put forward the living environment and operational strategy for sustainable development⁶; The book *Residence Regeneration Design Manual* by Japanese architectural firm MIKAN elaborated the housing renewal strategy from the perspectives of various possibilities in residence conversion, and analyzed residence conversion techniques by typical cases⁷. On the other hand, the United States, Europe, Japan and other countries have also carried out this practice for different types of residence conversion facilities for the elderly, which laid the foundation for the study of this article.

Through reference to the above theories and examples of conversion practice, the authors try to put forward a suitable method for converting existing residences into residential care facilities for the elderly in old communities in China and summarize it as the "4 x 9" method (Fig.10.).

(1) Functional Replacement Method
The functional replacement method is to add non-residential functions into the interior of a residential space from the perspective of functional use, so that the existing residence can have a variety of functions by forming a new space for elderly care. According to the different types of residence and demands, it can be divided into three sub-categories: single space replacement, multi-space replacement and whole building replacement.

(2) Additional Construction Method
The additional construction method is to add construction inside the original house, besides the house apart from the original residence. The advantage of the additional construction method is that it can use the additional structure to combine modern construction technologies with the existing residence to revitalize the original houses.

(3) Merge Method
The merge method changes the division of the original tenants in the residential building. The units will be re-divided and integrated, so as to obtain a new space structure. In the process of conversion, it is necessary to connect two units at the horizontal or vertical level to ensure the safety of the original structures and double the living area of an interior space.

(4) Spatial Reorganization Method
The spatial reorganization method re-integrates the interior space of the house by moving, dismantling and creating new partitions inside the house, so that the space inside the house has changes in scale, function and spatial organization to satisfy the different needs of the elderly (Fig.11.).

| Replacement method | Additional construction method |
|--------------------|-------------------------------|
| Single space replacement | Add construction between buildings |
| Multi-space replacement | Bottom space expansion |
| Whole building replacement | Additional construction for parts |
| Merger construction method | Space reorganization method |

Fig.10. Method of Residence Conversion into RCFE

Fig.11. Schematic Diagram of the Conversion Method

4. Positioning and Comparison
(1) The Similarity between Converted RCFE and Traditional Elderly Care Facilities
According to the definition of "2.0.3 Community Elderly Care Facilities" in the Local Standard for Engineering Construction in Beijing of Community Elderly Care Facilities Design Standards, Public service facilities provided for the elderly, include special care facilities such as nursing facilities, day
care stations and other public service facilities, as well as community health service stations, community disabled service centers, community management service rooms and other public services providing related services for the elderly. Therefore, the object in the study covers the category of community elderly care facilities. In actual conversions, we should comprehensively analyze the current situation of a residence, and apply proper methods suitable for residential conversion based on the relevant standards of research.

(2) The Difference between Converted RCFE and Traditional Elderly Care Facilities

Different scale: the scale of residence conversion of the facilities in this paper is smaller than other community elderly care facilities, and the number of nursing beds is around 10, which is a "micro" elderly care facility. Therefore, streamlining, space functions, spatial combination patterns and other aspects of the elderly care facilities are different.

Different service area: the services range of "micro" elderly care facilities, is different from other community elderly care facilities. As the residence conversion of the facilities with the features of "small, spiritual, and more", it can be set in the community flexibly, and the service area will be less than other community elderly care facilities.

Different service: covering the function of the RCFE in this paper includes living, life care, medical care, day care, elderly activities and other integrated services, which fails to include health service stations, disabled services, and management services in the community area.

5. Conclusion

This paper summarizes the four major categories and discusses the nine small class conversion methods on how to use vacant residences converted into the RCFE. Similarly, it also explores the conversion feasibility in the old community area. However, the authors acknowledge the necessity to conduct more research to test these methods. Due to study limitations, the study did not address the age-appropriate design of the RCFE's interior spaces. In addition, the construction of RCFE is a new thing and there are many challenges and researches that the authors still need to follow-up: such as fire protection, water protection, evacuation, emergency and other issues, and key technologies such as structural coping strategies.

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References

1) Linle. Talking about the Conversion of Old Residential Areas in Cities [J]. J·C·construction, 2016, 35.
2) Lijie. Current Situation and Evaluation of Beijing’s Urgent Renewal and Reconstruction of Old Residential District [J]. City, 2007, 03:59-62.
3) Beijing 2014 population information and status of the elderly Aging Development Report [EB/OL]. http://zhengwu.beijing.gov.cn/Stjxx/tjgb/t1412150.htm, 2015-11-26.
4) Building Design Specifications of Elderly Care facility GB50867-2013.
5) Beijing Elderly Care industry blue book: Beijing Elderly Care industry development report (2015) [M]. Zhou Mingming, Feng Xiliang. Beijing: Social Science Academic Press, 2015.
6) (Japan) Shuichi Matsumura. Residential regeneration - to renovate the new European and American collection of residences [M]. Fan Yue, Liu Tongtong Translation. Beijing: Machinery Industry Press, 2008.
7) (Japan) MIKAN. Residential Recycling Design Handbook [M]. Fan Yue, Zhou Bo Translation. Dalian: Dalian University of Technology Press, 2009.

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