Model and Application of Traditional Courtyard-style Aging-friendly Affordable Housing

Huayue Wang

Soochow University, Suzhou 215000, Jiangsu, China

Abstract: In recent years, when formulating policies for affordable housing in China, most considerations have been made from the macro perspective of policy guidance, financial support, and social and urban development. Yet, there is a lack of in-depth attention to the residents of affordable housing, especially the significant elderly population. Therefore, this study aims to focus on this demographic, delve into their actual needs, and propose targeted aging-friendly renovation suggestions.

Keywords: aging-friendly housing, traditional courtyard-style

1. Introduction

1.1 Problems Existing in Traditional Affordable Housing

1.1.1 Insufficient Layout Design and Accessibility Design

Layout Design: The layout design of affordable housing often follows the standards of regular residential properties, lacking specialized considerations for aging. Therefore, in regular residences, especially in smaller public rental housing and low-rent housing, it is often difficult to meet the standards of accessibility design. Relatively larger economical housing and resettlement housing perform better in terms of accessibility design, but there are still shortcomings in accessibility design in small spaces like kitchens and bathrooms, as well as in interior details. [1]

Lack of Accessibility Design: Many affordable housing units lack accessibility facilities such as handrails and non-slip floor tiles, increasing the risk of falls for the elderly. Additionally, the width of staircases and corridors may be insufficient, making it inconvenient for the elderly to use walking aids or wheelchairs.

1.1.2 Mismatched Community Facilities and Services

Lack of Recreational Facilities: Affordable housing communities lack recreational facilities suitable for the elderly, such as fitness equipment, game rooms, and libraries. This limits the social and recreational activities of the elderly, affecting their physical and mental health. Moreover, the higher floors in new communities may create a sense of distance and oppression, making it difficult for residents to feel a sense of warmth and security [2].

1.1.3 Community Home-based Elderly Care Service Facilities

Although some communities have reached the standard in scale, overall, community home-based elderly care service facilities still face issues of inadequate distribution and unreasonable layout. This makes it difficult for their service scope to effectively cover the entire area, especially at the community level, where there is a significant gap in home-based elderly care service facilities. Regarding the supporting facilities for community home-based elderly care services, not only is the service content insufficient, but also there is a lack of consideration for aging-friendly design in the initial construction phase, resulting in deficiencies in accessibility facilities [3].

1.2 Advantages of Traditional Courtyard-style Housing

(1) Fostering a Comfortable Natural Environment. The primary enclosure structure of traditional courtyards in China typically involves three-sided or four-sided enclosures, often with green spaces within the courtyards. This not only beautifies the environment but also provides a place for the elderly to connect with nature [4]. The presence of courtyards ensures good ventilation and lighting indoors, contributing to fresh indoor air and enhancing the physical health of the elderly. Additionally, unlike typical affordable housing, the courtyard provides an effective venue for the formation of neighborly relationships [5].

(2) Enhancing Community Atmosphere and Sense of Belonging. In courtyard-style buildings, residents are often familiar with each other, forming a tight-knit community network. This neighborhood relationship facilitates communication and mutual assistance among the elderly, reducing feelings of loneliness. Courtyard spaces can also serve as venues for community activities, such as elderly gatherings and holiday celebrations. These activities enrich the spiritual life of the

elderly and foster friendship and a sense of community belonging.

(3) Facilitating the Establishment of Autonomous Aging Models. Autonomous aging refers to the active participation and self-directed planning of the elderly in designing and innovating their own lives. Utilizing the spacious courtyards formed by courtyard-style combinations provides opportunities for younger elderly residents to plan and enrich their daily lives, reducing feelings of loneliness due to lack of social participation.

1.3 Aging-friendly Design in Traditional Courtyard Settings

1.3.1 Physiological Aspect

Elderly individuals have distinct physiological needs compared to younger adults, necessitating a more nuanced approach to residential environment design. Physiologically, older adults have a heightened requirement for sunlight and ventilation, reflecting both their emphasis on hygiene and their desire for warmth.

Considering the decline in elderly individuals' mobility and sensory functions, areas such as bathrooms and kitchens should feature anti-slip flooring and sturdy handrails to ensure their safety. Furthermore, during renovation designs, adapting to changes in elderly individuals' physical functions while maintaining spatial openness and visibility can be achieved by reducing solid partitions and employing flexible dividers. For instance, the use of glass partitions not only allows for line-of-sight penetration but also balances indoor brightness, making the space brighter [6].

1.3.2 Psychological Aspect

According to Maslow's hierarchy of needs theory, human needs are divided into 5 levels, from lower to higher: physiological needs, safety needs, belongingness and love needs, esteem needs, and self-actualization needs.

(1) Physiological Needs. The physiological needs of the elderly mainly focus on basic survival and health. For example, ensuring that walkways within the courtyard are flat and non-slip, providing adequate lighting and ventilation, and designing outdoor furniture and facilities that are easy to use.

(2) Safety Needs. In a courtyard setting, safety is paramount. Elderly individuals may be concerned about falling, getting lost, or encountering emergencies. Therefore, design considerations should address these factors to ensure the safety of the courtyard. For example, setting up clear signage and indicators, installing surveillance cameras, and providing emergency call systems.

(3) Social Needs. Social interaction is an essential aspect of elderly life, as they yearn to engage and communicate with others. In design, efforts should be made to encourage social interaction, such as setting up shared outdoor spaces, leisure areas, and gathering spots to facilitate communication and connections among the elderly.

(4) Esteem and Self-Actualization Needs. Elderly individuals also desire respect, recognition, and the pursuit of self-realization and accomplishment. For example, setting up gardening areas for elderly participation in planting and caring for plants, or providing reading corners for them to read and learn. Such designs not only meet the self-actualization needs of the elderly but also make them feel respected and valued.

2. Design Concept for Traditional Courtyard-style Aging-friendly Affordable Housing

Incorporating the layout pattern of traditional courtyards into the planning and design of affordable housing not only embodies the inheritance of traditional culture but also adapts to modern lifestyles. By combining high-rise buildings with low-rise multi-story buildings, a diverse spatial hierarchy and visual experience can be created within the same plot [7].

Firstly, when planning high-rise buildings, emphasis should be placed on the rational layout and openness of space. High-rise buildings can be arranged along the perimeter of the plot to form an enclosed layout, thereby leaving a central courtyard space for low-rise multi-story buildings. Such a layout not only facilitates the creation of large-scale, panoramic courtyard spaces but also enhances the overall sense of community and belonging. Secondly, the design of low-rise multi-story buildings should fully embody the enclosed spatial form of traditional courtyards. The courtyard space formed by the enclosure of low-rise multi-story buildings can create a quiet, comfortable, and pleasant living environment. Additionally, the design of courtyard spaces should focus on creating landscapes, combining local regional garden styles, using local materials and plants to create garden landscapes with local characteristics.

In the process of continuing the design of traditional courtyard-style layouts, attention should be paid to the refinement and application of traditional elements. For example, traditional architectural symbols, decorative elements, and color combinations can be used to integrate modern architecture with traditional elements, forming a unique and harmonious architectural style.

(1) High-rise buildings are typically used to provide relatively private residential spaces, while low-rise multi-story

buildings are more suitable for creating open and ventilated community environments. Combining these two can achieve diverse space utilization and provide residents with different options. Additionally, the combination of high-rise buildings and low-rise multi-story buildings can integrate vertical and horizontal transportation organically [8]. For example, community activity centers, medical and health service centers, and other public facilities can be set up in low-rise multi-story buildings, while high-rise buildings can be used for residential purposes. Through proper connecting corridors, various building units can be linked together conveniently, facilitating the daily lives of the elderly [9].

(2) Landscape Design. The landscape design of traditional courtyard-style aging-friendly affordable housing takes the tone of modern Chinese style, aiming to integrate traditional culture into modern living environments and provide comfortable and habitable living spaces for the elderly. When designing walls, traditional materials such as grey tiles or bricks can be used, supplemented with antique carvings or traditional decorative elements. This not only highlights the cultural heritage of the architecture but also adds a historical atmosphere to the courtyard. In terms of color scheme, dark tones or natural colors such as deep red, navy blue, and muted green can be chosen to blend with the surrounding natural environment, creating a rustic and elegant atmosphere.

In terms of materials, it is recommended to choose environmentally friendly and durable materials such as wood and stone, while also incorporating modern materials and technologies to ensure the quality and comfort of the buildings.

In terms of spatial planning, it is important to properly divide the inner and outer courtyards, with the front courtyard serving as a place for communication and leisure, and the rear courtyard as a private residential area, ensuring the privacy and comfort of the elderly residents [10]. Through such designs, not only can the living needs of the elderly be met, but also a living environment with rich cultural heritage can be created, providing them with a safe, comfortable, and humanistic home.

(3) Facade Design. Facade design is an integral part of the overall building appearance. It not only needs to meet the requirements of architectural aesthetics but also consider the special needs and living habits of the elderly. When designing the facade, traditional Chinese architectural features should be considered, such as symmetrical layout, eaves decoration, and corner designs. These elements not only reflect the solemnity and stability of the building but also create the unique charm of traditional Chinese architecture.

In terms of material selection, attention should be paid to environmental friendliness, durability, and ease of maintenance. It is recommended to use traditional building materials such as bricks, stones, and wood, and enhance their waterproofing and durability through surface treatments to ensure long-term use of the building.

Additionally, traditional cultural uniqueness can be highlighted through wall decorations or ornaments, enhancing the cultural heritage of the building. The overall design should emphasize proportion coordination and exquisite details, reflecting the charm and taste of traditional culture.

3. Conclusion

In conclusion, the application of traditional courtyard-style architecture in age-friendly affordable housing holds vast prospects and enormous potential. By deeply exploring its advantages and integrating modern design concepts and technological means, we can create a better living environment and home for the elderly, enriching their lives and enhancing their well-being.

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