

Research on the Renovation of Rural Buildings Suitable for Aging Populations Based on Cross-Analysis

Zhengming Zhu*, Feiyan Li

Zhejiang College of Construction, Hangzhou 311231, Zhejiang Province, China

*Corresponding author: Zhengming Zhu, 001487@zjjs.edu.cn

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Abstract: Based on the intersection of “Implementing the National Strategy to Actively Cope with Population Aging” and “Guiding Opinions on Future Rural Construction” in Zhejiang Province, this study constructed the evaluation index system of rural age-appropriate building space. This is done by analyzing the current situation locally and internationally, summarizing the existing problems, and optimizing countermeasures. The cross-analysis method is adopted by fully listening to the opinions of the elderly and introducing a professional team to transform the physical, psychological, and rural natural environment of the elderly. The renovation strategies of building layout, indoor and outdoor space, and supporting facilities for the elderly are put forward. Looking to the future, including the application of intelligent technology, the development of a community pension model, and multi-party cooperation, it aims to create a comfortable, safe, and convenient living environment for rural elderly people, improve the quality of life, promote rural revitalization and actively respond to the challenges of population aging.

Keywords: Cross-analysis; China; Aging population; Rural building renovation

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1. Introduction

With the acceleration of population aging in China, actively addressing the needs of the aging population has become a national strategy. At the same time, the implementation of the rural revitalization strategy has created new opportunities for rural development. In the context of these two major policies, accelerating the renovation of rural buildings to make them suitable for an aging population holds great practical significance^[1]. The purpose of this study is to develop a set of evaluation indices for aging-friendly building spaces in rural areas, aimed at improving the quality of life for the rural elderly, promoting rural revitalization, and proactively addressing population aging.

2. The importance of age-appropriate building space in rural areas

Firstly, it is essential to meet the needs of the elderly. Rural areas have a large elderly population with higher requirements for safety, convenience, and comfort in their living environments. Renovating building spaces to be age-appropriate can address the daily needs of the elderly and improve their quality of life ^[2].

Secondly, the renovation will support rural revitalization. By making rural building spaces more age-friendly, it can encourage more elderly residents to remain in rural areas, bringing additional human resources and consumer demand to boost the rural economy. This renovation can also enhance the overall image and attractiveness of rural areas, further supporting the rural revitalization strategy.

Thirdly, this approach actively addresses population aging. Renovating rural spaces for aging populations is an important step in responding to the challenges of an aging society. Improving the living environment for elderly residents can enhance their self-care capabilities and well-being, while also reducing the caregiving burden on families and society ^[3].

3. Research on rural aging-friendly building space, locally and internationally

3.1. Local research status

3.1.1. Existing problems

Domestic research on aging-friendly rural buildings primarily identifies the following issues: inadequate infrastructure, such as uneven roads and a lack of barrier-free facilities; limited spatial flexibility that fails to meet the diverse needs of the elderly; and wasted natural resources, as the rural natural environment is not fully utilized in age-friendly design ^[4].

3.1.2. Optimization countermeasures

To address these issues, domestic scholars have proposed various optimization strategies. Progressive transformation, spatial complexity, predictive design, attention to detail, and maximizing existing advantages offer new approaches for the protection and development of traditional villages. Transformation strategies for traditional village landscapes in Hunan include adjustments to waterfront areas, public buildings, and road spaces. From the perspective of smart governance, these strategies advocate for age-appropriate renovations in rural building spaces, supported by a smart elderly care system. They emphasize that the design of elderly care spaces should meet the needs of the elderly while prioritizing safety and comfort. Additionally, an age-friendly transformation demand scale has been developed to assess the home environment needs of rural elderly individuals with disabilities.

3.2. International research status

International research on age-friendly rural renovation focuses on maximizing the cost-effectiveness and overall benefits of age-appropriate interventions. It emphasizes that sustainable transformations of cities and villages should begin with technical and social diagnostics, followed by comprehensive assessments aimed at enhancing social benefits and economic value. An innovative approach has been introduced for designing rural architectural environments with tailored parameters for different age groups of the elderly, aiming to maximize benefits.

4. Renovation method of rural buildings suitable for aging population based on cross-analysis

The renovation method of rural age-appropriate building space based on cross-analysis aims to create a more

comfortable, safe, and satisfying living environment for rural elderly people ^[5].

The first step of cross-analysis is to combine the physiological characteristics of the elderly with the physical characteristics of the building space. Considering that the physical function of the elderly is declining and the movement may be inconvenient, it is necessary to pay attention to barrier-free design in the renovation of architectural space. For example, door openings were widened for wheelchair access, gentle ramps were installed instead of stairs, and strong handrails were installed in hallways and toilets ^[6]. Simultaneously, use non-slip ground materials to reduce the risk of elderly people slipping.

Secondly, from the perspective of psychological needs, elderly individuals in rural areas often have a strong desire for social interaction and care. Increasing public activity spaces by transforming the building layout—such as creating shared courtyards or activity rooms for the elderly—can provide spaces for communication and recreation, helping to alleviate their loneliness ^[7].

Thirdly, a cross-analysis is conducted in conjunction with the advantages of the rural natural environment. By leveraging the fresh air and beautiful scenery of the countryside, leisure walks and viewing platforms can be incorporated around the building to encourage outdoor activities for the elderly, promoting both physical and mental health. Small gardens can also be created for the elderly to engage in planting, adding to the enjoyment of life.

During the renovation process, it is essential to fully consider the opinions and suggestions of the elderly. Through methods such as questionnaires, symposiums, and other forms of feedback, their actual needs and expectations should be understood, allowing for continuous adjustments to the transformation plan. Concurrently, professional design teams and elderly care service institutions should be involved in the renovation of age-appropriate rural building spaces to ensure that the renovated areas are not only aesthetically pleasing and functional but also meet the specific needs of the elderly, thereby laying a solid foundation for the development of rural elderly care ^[8].

5. Space transformation strategy of rural aging buildings

The renovation strategy for rural aging building spaces includes optimizing building layouts, renovating indoor spaces, improving outdoor environments, and providing supporting elderly service facilities. The architectural layout should prioritize ventilation, lighting, public spaces, and the efficient use of idle buildings. Indoor design should focus on functional zoning, lighting, ventilation, and age-friendly features. Outside, barrier-free facilities should be added, roads improved, and leisure areas and greenery enhanced. Elderly service facilities should be tailored to local needs, encourage social participation, strengthen management and operation, and establish a comprehensive service system. These strategies aim to create a comfortable, safe, and convenient living environment for rural elderly residents, ultimately improving their quality of life ^[9].

5.1. Building layout optimization

In the renovation of aging building spaces in rural areas, the optimization of the building layout can be approached from the following aspects.

Firstly, scientifically plan the location and orientation of the buildings. Consider local climate conditions and topography to ensure a reasonable layout that promotes good ventilation and lighting. For example, the direction of openings should align with the prevailing wind direction to allow natural airflow into the interior. The building's orientation should also be adjusted according to the angle of sunlight, ensuring the elderly can fully enjoy sunlight.

Secondly, increase the spacing between houses moderately. This not only improves ventilation and lighting

but also provides a quieter living environment for the elderly. Additionally, small gardens or green spaces can be planned in the open areas between houses, creating a natural atmosphere^[10].

Thirdly, reserve sufficient space for public activities. Create a multifunctional square equipped with leisure benches, patio umbrella, and other amenities, making it convenient for the elderly to gather, chat, and enjoy the sun. Develop a beautiful garden with a variety of flowers and greenery, providing an ideal place for the elderly to walk and appreciate nature.

Fourthly, repurpose idle building resources. Old houses and warehouses in rural areas should be evaluated and transformed into elderly service facilities such as activity centers and daycare centers. During the transformation, focus on functionality and comfort while improving the efficiency of resource utilization.

Finally, ensure integration with the overall rural environment. In architectural design, retain the characteristic landscapes and cultural elements of the countryside, allowing new buildings to complement the rural style and contribute to a harmonious, livable atmosphere.

5.2. Interior space renovation

The renovation of interior spaces in aging buildings in rural areas should consider multiple aspects. Firstly, optimize functional zoning scientifically. Position the bedroom near the entrance to facilitate access for the elderly and reduce mobility challenges. Place the bathroom adjacent to the bedroom for convenient nighttime use. Plan the interior layout to ensure that furniture placement does not obstruct movement paths and leaves sufficient activity space for the elderly^[11].

Secondly, focus on improving the lighting and ventilation effect. The window size can be expanded, and the glass material with good light transmission can be used to increase the intake of natural light. Install ventilation equipment or reasonably designed vents to ensure air circulation and improve living comfort. Moreover, the comprehensive implementation of age-appropriate design. Install strong and suitable height handrails on the indoor walls to provide support for the elderly to get up and walk. Lay non-slip floor tiles to reduce the risk of slipping. Modify the stairs to reduce the slope, increase the width of the steps, and set up a rest platform. Add barrier-free toilets, equipped with sanitary ware and auxiliary facilities that are convenient for the elderly. Furthermore, it can also have personalized decoration according to the preferences of the elderly to create a warm and comfortable living atmosphere.

5.3. Improvement of outdoor environment

In terms of improving the outdoor environment of rural aging buildings, firstly, implement barrier-free facilities. Install ramps and handrails on roads, entrances, and steps to ensure safe and smooth travel for the elderly^[12]. Secondly, the countryside roads should be leveled and hardened. Eliminate potholes and obstacles, improve traffic conditions, and facilitate the elderly to walk and use assistive devices such as wheelchairs. Thirdly, increase leisure facilities and green landscapes. Install fitness equipment suitable for the elderly, such as walking machines, waist twisters, and many more to meet their fitness needs. Set up benches for the elderly to rest and chat. Arrange flower beds and plant various flowers to add beauty and vitality. Fourthly, make full use of the rural natural environment. Preserve the original trees, mountains, rivers, and other natural landscapes, and create an ecologically livable rural landscape. Some flowers and trees can be planted around the area to create an outdoor environment with scenery in all seasons and provide a comfortable outdoor activity space for the elderly^[13].

5.4. Supporting elderly care service facilities

Rural elderly care service facilities need to consider various factors. Firstly, the actual situation of rural elderly

care should be assessed. This includes constructing elderly homes and apartments, equipped with professional nursing staff and medical facilities, to provide centralized care services for the elderly.

Secondly, actively encourage social participation in rural elderly care. Through policy guidance and financial support, attract businesses and social organizations to invest resources in developing home-based care services^[13]. To provide the elderly with home nursing, rehabilitation services, meal assistance, and other diversified services to meet the needs of different elderly people. Moreover, the management and operation of elderly care service facilities should be strengthened. Establish and improve management systems, standardize service processes, strengthen personnel training, and improve service quality and level.

Finally, establish and improve the elderly service system. Integrate the resources of the government, society, enterprises, and other parties to form a joint force to provide all-round and multi-level elderly care services for the rural elderly, including life care, medical care, cultural entertainment, psychological comfort, and so on.

6. Prospects for the aging-friendly transformation of rural building space in the future

6.1. Application of intelligent technology

In the future, the application prospect of intelligent technology is broad in the renovation of rural aging-friendly building space. Smart home systems will become an important means to improve the quality of life of the elderly. Through smart devices, the elderly can remotely control home appliances, such as adjusting lights, temperatures, and many more, without getting up to operate, greatly improving the convenience of life. Simultaneously, health monitoring equipment can monitor the physical conditions of the elderly in real-time, such as heart rate, blood pressure, sleep quality, and so on, and transmit the data to family members or medical staff to detect potential health problems in time^[14]. The intelligent security system provides comprehensive security for the elderly. For example, door and window sensors trigger an alarm if they detect abnormal openings, and smoke alarms quickly sound in the event of a fire. Additionally, intelligent voice assistants can help the elderly complete various operational instructions, such as querying the weather, playing music, and the like, to add fun to the life of the elderly. The application of intelligent technology will make rural aging buildings more convenient, comfortable, and safe.

6.2. Development of community pension model

The community pension model will play an important role in the future of rural pensions. Community service centers for the elderly will be built to provide diversified services for the elderly, such as daycare, rehabilitation nursing, culture, and entertainment. In terms of daycare, the elderly can be provided with catering, rest, entertainment, and other services, so that they can be properly taken care of during the day. In terms of rehabilitation care, it is equipped with professional nursing personnel and equipment to provide rehabilitation training and nursing services for the elderly in need. In terms of culture and entertainment, various cultural activities are organized, such as calligraphy, painting, singing, and the like, to enrich the spiritual life of the elderly. The community aged care model can also promote communication and interaction among the elderly and reduce loneliness. By constructing community service centers for the elderly, the desire for aging-in-place can be fulfilled, improving the overall quality of life for elderly individuals.

6.3. Promotion of multi-party cooperation

The renovation of rural building spaces suitable for the aging population requires the combined efforts of the

government, society, enterprises, and families. The government should increase investment in rural elderly care, formulate relevant policies and regulations, and provide policy support for the renovation of aging-friendly buildings. For example, introducing preferential policies to encourage enterprises to participate in the construction of rural elderly care facilities, as well as increasing financial investment in elderly care services to improve their quality.

Social organizations can support rural elderly care through donations and volunteer services. Enterprises can leverage their technological and financial advantages to provide products and services for the renovation of rural aging building spaces. This may include developing smart home equipment, as well as rehabilitation and nursing equipment tailored for the elderly, and participating in the construction and operation of rural elderly care facilities.

Families should take on the responsibility of supporting the elderly, offering both care and emotional support. Family members should pay closer attention to the life and health of elderly relatives, providing them with companionship and spiritual support.

Through multi-party cooperation, a powerful collective force can be built to jointly promote the renovation of rural buildings suitable for aging, ensuring a better quality of life for rural elderly residents in their later years ^[15].

7. Conclusion

The renovation of rural age-appropriate building space is of great significance, which is not only related to the happiness of the elderly but also promotes the revitalization of the countryside and actively responds to the aging population. By constructing an evaluation index system, adopting a cross-analysis method, implementing a multi-faceted transformation strategy, and looking forward to future development direction, we are committed to creating comfortable, safe, convenient, and humane living spaces for rural elderly people. Let us work together to integrate the resources of all parties, promote the renovation of rural buildings suitable for aging, make rural areas a warm home for the elderly to enjoy their old age, and contribute to the realization of national strategic goals and sustainable development of rural areas.

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