

Research on Aging-friendly Human Settlement Design in Rural Areas from the Perspective of Rural Revitalization—Spatial Response and Value Reconstruction in an Aging Society

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Abstract: With the deepening of the rural revitalization strategy and the intensification of population aging in rural areas, aging-friendly human settlement design has become a key breakthrough for improving rural livability and promoting sustainable development. This study breaks through the traditional mindset of "urban model replication" and innovatively proposes a dual framework of "spatial justice + local adaptability." Through field surveys and action research methods, it accurately identifies the differentiated needs of rural elderly groups in scenarios such as tool storage, neighborhood socialization, and intergenerational integration. Based on this, a three-tier strategy system of "hierarchical services—functional integration—smart empowerment" is constructed. This research provides a solution for the transformation of aging-friendly rural areas that combines theoretical innovation and practical operability, demonstrating a student-led research path of "problem-oriented—local innovation—dynamic adaptation."

1. Introduction

The "14th Five-Year Plan" explicitly proposes "implementing rural construction actions to improve rural living environments." According to the Seventh National Population Census, 23.81% of China's rural population is aged 60 or older, a significantly higher proportion than in urban areas. However, issues such as rural hollowing, outdated facilities, and lack of aging-friendly design severely constrain rural revitalization and the quality of life for the elderly.

With the increasing emphasis on rural revitalization, rural areas are constantly being impacted by social mobility in terms of space, society, economy, and culture. Constructing a systematic framework for rural aging-friendly design fills the gap in aging research under the urban-rural divide. The urgent need to address the elderly care issue in rural areas has become a priority. As modern society develops, a growing number of young and middle-aged people with certain levels of education and cultural reserves are returning to rural towns. This trend is reinforced by the increasing "counter-urbanization" movement of urban residents. Driven by the strong advocacy for rural tourism in the context of beautiful countryside construction, more and more urban residents are moving back to rural areas, either for retirement or tourism. Improving the aging-friendly living space in rural areas provides an actionable solution for rural transformation, and helps achieve the coordinated goals of "supporting the elderly" and rural revitalization. Constructs a systematic framework for aging-friendly design under the urban-rural dichotomy, filling the gap in the application of "spatial justice" theory in rural contexts.

This study is based on the systematic, long-term, and differentiated characteristics of the Rural Revitalization Strategy, and constructs a three-dimensional research framework integrating "theory, empirical evidence, and policy recommendations." This framework aims to comprehensively deconstruct the development bottlenecks and breakthrough pathways for the traditional village-based retirement living model.

The study employs a variety of research methods, including literature review, comparative analysis, and qualitative analysis. These methods are used to thoroughly investigate the problems, causes, and solutions related to traditional village-based retirement living under the Rural

Revitalization Strategy. By consulting relevant research literature and collecting and organizing relevant materials, the study quantitatively analyzes the issues and treats them as a system for in-depth analysis. Combining practical operations, the study proposes actionable suggestions and measures.

Through these research methods, this study aims to provide theoretical guidance and practical references for the development of traditional village-based retirement living under the Rural Revitalization Strategy. The Rural Revitalization Strategy is an important initiative proposed by China to promote comprehensive development in rural areas, encompassing economic, social, cultural, and ecological aspects. Its main objective is to improve the living standards of farmers and achieve integrated development between urban and rural areas. By leveraging the resource advantages of rural areas, this strategy seeks to promote sustainable rural development and provide a better living environment for farmers.

2. The Current Status and Issues of Aging-friendly Rural Human Settlements

In the wave of advancing the Rural Revitalization Strategy and the construction of beautiful countryside, the protection and development of traditional villages are also being actively promoted.

2.1 Current Characteristics

Functional Confusion in Traditional Courtyards: Traditional courtyards are characterized by mixed functions, leading to disorganized spatial layouts.

Shrinking Public Spaces: Public spaces are diminishing, failing to meet the needs of community activities.

Lack of Barrier-free Facilities: There is a significant absence of barrier-free facilities, posing challenges for the mobility and accessibility of the elderly.

Insufficient Medical Facilities: Limited access to healthcare services, with inadequate medical resources. **Lack of Cultural and Social Facilities:** A dearth of cultural and social venues, making it difficult to meet the daily needs of the elderly.

Inability to Satisfy Daily Needs: The existing facilities are unable to adequately support the everyday requirements of the elderly population.

Conflict Between Modern Architecture and Local Culture: Modern architectural styles clash with traditional rural culture, creating a sense of incongruity.

Weakening Sense of Belonging Among the Elderly: The erosion of local cultural heritage results in a diminished sense of belonging and identity for the elderly.

Rural aging-friendly transformation faces many challenges, including government policy support, related market operations, and social community participation.

2.2 Core Contradictions

Rural areas lack specialized concepts for elderly care services. Limited by economic and material conditions, the absence of corresponding standards and norms makes it difficult to implement aging-friendly transformations.[1] Rural areas lack specialized concepts for elderly care services. Limited by economic and material conditions, the absence of corresponding standards and norms makes it difficult to implement aging-friendly transformations.

Currently, rural public space renovations frequently employ an "urban template" approach, which overlooks the unique living requirements and cultural characteristics of rural elderly populations. To address this issue, this study proposes a comprehensive strategy that begins with the precise identification of needs. By analyzing the daily activity patterns of rural elders, including agricultural tool storage, social interactions in threshing areas, and intergenerational care activities, key indicators for age-friendly modifications are established. The strategy then focuses on enhancing social participation through spatial design. By improving accessibility and multifunctional integration, community ties are strengthened, and both physical and mental well-being are promoted. Additionally, the strategy emphasizes cultural continuity by preserving rural memory markers, such as traditional courtyard layouts and local building materials, during

renovations. This ensures a harmonious blend of contemporary functionality and cultural heritage. Ultimately, this integrated approach aims to simultaneously upgrade living environments, improve elderly care services, and revitalize rural culture through targeted spatial improvements, thereby achieving the dual objectives of ensuring quality senior care and maintaining vibrant village life.

3. Principles and Strategies for Rural Aging-friendly Design

3.1 Design Principles

Under the context of home-based elderly care, family and community public spaces together form the living domain for the elderly. Public spaces, as venues for daily life, directly impact the quality of life for the elderly. They can provide activities such as exercise, health care, and leisure entertainment, playing an important role in considering both the physical and mental health of the elderly. Currently, research on rural aging-friendly design in China is still in the developmental stage. Xiao Yongfeng (2016) proposed integrating tourism and rural elderly care through a "cooperative + enterprise" model, creating new pathways for urban elderly tourism while improving the rural elderly care environment [1]. Zhao Tong (2019) focused on public spaces in rural areas of Xuzhou and proposed renovation strategies from five aspects: form, function, aesthetics, perceptual experience, and social activities, based on the needs of the elderly [2].

Integrated Upgrading and Reuse: Strengthen the integration of resources. While constructing aging-friendly rural spatial scenes, build cultural experience scenes. Upgrade rural public spaces by designing spatial scenes based on traditional rural culture. This can not only improve the quality of life for left-behind elderly but also provide public spaces and enhance public awareness. It also promotes the reuse of rural tourism resources and creates a new rural image by combining children's living spaces.

Safety First: Eliminate hazards caused by height differences and improve night lighting and emergency call systems. Start from embedding daily life scenes to construct functional spaces that meet daily needs. Adapt to the daily behavior patterns and schedules of the elderly to make safety improvements in activity spaces.

Local Integration: Retain local materials (such as rammed earth and blue bricks) and courtyard layouts while integrating modern aging-friendly technologies. Retain and upgrade the daily living spaces of the elderly by using appropriate locations and original materials to create a sense of belonging. Retain local materials (such as rammed earth and blue bricks) and courtyard layouts while integrating modern aging-friendly technologies. Retain and upgrade the daily living spaces of the elderly by using appropriate locations and original materials to create a sense of belonging. This approach not only respects the cultural heritage of the rural areas but also ensures that modern technologies are effectively utilized to enhance the living conditions of the elderly.

Intergenerational Coexistence: Create all-age shared spaces (such as under the village tree, ancestral hall squares, and public spaces) to promote intergenerational interaction. Increase community participation and strengthen publicity and guidance. Use aging-friendly renovations to drive rural revitalization and develop new rural elderly care models.

In the context of home-based elderly care, both family and community public spaces collectively constitute the living domain for the elderly. Public spaces, as the venues for daily life, have a direct impact on the quality of life for the elderly population. These spaces can provide a variety of activities, including exercise, health care, and leisure entertainment, all of which play a crucial role in considering both the physical and mental health of the elderly. At present, research on rural aging-friendly design in China is still in its developmental stage. Xiao Yongfeng (2016) proposed integrating tourism and rural elderly care through a "cooperative + enterprise" model, which not only creates new pathways for urban elderly tourism but also improves the rural elderly care environment [3]. Zhao Tong (2019) focused on public spaces in rural areas of Xuzhou and proposed renovation strategies from five aspects: form, function, aesthetics, perceptual experience, and social activities, all based on the needs of the elderly [4].

3.2 Spatial Optimization Strategies

Home aging-friendly renovations (such as installing handrails, anti-slip flooring). Create a "5-minute living circle" (including clinics, convenience stores, activity centers). Link township nursing homes with rural mutual aid elderly care points. Transform abandoned school buildings into complexes that integrate elderly care, childcare, and cultural functions. Coordinate resources between town nursing homes and village mutual aid elderly care points to form a linked care network. Combine farmland landscapes with rehabilitation gardens to provide spaces for horticultural therapy.

Use smart health care to support rural elderly care: Utilize telemedicine, smart health monitoring, and introduce aging-friendly smart devices such as one-touch emergency calls and health monitoring to improve rural elderly care services.

Develop a "Health Care + Rural Leisure" Model: Attract urban elderly to rural areas for tourism and retirement, boosting the rural economy. This can also encourage young people who have moved away to return and start businesses, developing the silver economy and creating rural elderly care tourism products to achieve a virtuous cycle of "spatial transformation—industrial revitalization."

Currently, there is a common issue of "urban model replication" in the aging-friendly transformation of public spaces in traditional villages, ignoring the unique characteristics of rural elderly groups in terms of lifestyle, activity patterns, and spatial needs. Rural elderly, constrained by their habits of agricultural labor, intergenerational interaction needs, and cultural identity, have significantly different public space requirements from urban elderly populations. The research advocates an in-depth local perspective, analyzing the daily activity patterns and differentiated spatial preferences of rural elderly to identify key factors affecting aging-friendliness (such as the convenience of storing agricultural tools and accessibility for social interaction). This demand-oriented approach not only optimizes the safety and convenience of the elderly living environment but also empowers them through spatial design to promote social participation and mental and physical health, ultimately achieving an overall improvement in rural elderly care welfare.

Combine farmland landscapes with rehabilitation gardens to provide age-friendly activity spaces for horticultural therapy and agricultural experiences. Introduce remote medical consultations and smart health monitoring devices, and equip with age-friendly technological products such as one-touch emergency calls and fall alarms. Develop a digital elderly care service platform to enhance the precision and response efficiency of rural elderly care services[5].

Promote rural homestay and health care tourism, attracting urban elderly to spend their time in rural areas and boosting the development of industries such as guesthouses and ecological agriculture.

3.3 Human-Centered Design: A Return to the Essence in Rural Aging-Friendly Design

In the context of rural aging-friendly design, practicality and safety should be given top priority. It is essential to adhere to the principles of human-centered design, taking into account the behavioral patterns and usage needs of the elderly. From a practical standpoint, functional settings and spatial layouts should be meticulously planned to ensure sustainable development of functions. Additionally, local cultural characteristics and regional spatial features should be integrated into the design. The use of ecological technologies and the enhancement of villagers' ecological and environmental awareness are also crucial aspects to consider.

The core principle of rural aging-friendly design is to achieve optimized movement paths through behavior-oriented practical design. Given the physical decline associated with aging, the radius of high-frequency activity areas, such as kitchens and bathrooms, should be controlled within 15 meters to minimize unnecessary movement. The design should also focus on functional suitability, incorporating aging-friendly rest areas in public spaces within rural communities.

Furthermore, the design should aim to link spatial development with local industries. By promoting rural tourism, it is possible to achieve rural revitalization and create a sustainable and harmonious living environment for the elderly. This approach not only enhances the quality of life

for the aging population but also fosters economic and social development in rural areas.

The revitalization and renewal of traditional villages oriented towards aging-friendly design refer to the process of addressing the physiological and psychological characteristics of the elderly in the design of roads, external spaces, public buildings, and landscape layouts within traditional villages. In this context, it is essential to consider not only basic physiological needs through barrier-free design but also to fully integrate the optimization of spaces and landscapes with the needs of the elderly, thereby making the public spaces of traditional villages more humanized and functional.

In terms of design strategies, the revitalization and renewal of traditional villages oriented towards aging-friendly design must prioritize the design philosophy of “putting the elderly first.” During the process of revitalization and renewal, it is crucial to engage in empathetic thinking, fully incorporating the needs of the elderly into the design. All spatial details should be adapted to the physical capabilities and psychological states of the elderly, with the goal of providing the greatest possible convenience in their daily lives.

3.4 Empowering Rural Cultural Space: Constructing a Three-Dimensional Carrier of “Memory-Experience-Healing”

Strengthening Cultural Heritage and Protection to Enhance the Attractiveness of Traditional Village-Based Retirement Living: Development Strategies under the Rural Revitalization Strategy

Focusing on cultural heritage and protection as the core, this study systematically constructs development strategies for traditional village-based retirement living under the Rural Revitalization Strategy. These strategies are divided into three major dimensions: innovation in spatial carriers, dynamic heritage mechanisms, and integrated industrial pathways. A quantifiable and operational implementation framework is provided.

Rural elderly care is a key element in the high-quality development of rural revitalization and urban-rural integration. The social support for rural elderly individuals includes multiple sources, such as the state, communities, family members, and social organizations. It is urgent to focus on the health status of rural elderly individuals, as well as the current situation and practical challenges of formal and informal social support. Policy recommendations for improving the social support system for rural elderly individuals should be proposed from multiple aspects, including government, community, family, and society.

Firstly, based on the recently released national standard “Norms for the Assessment of Elderly Capability” (GB/T 42195-2022), the national basic public service standards should be implemented for rural elderly individuals aged 65 and above. Comprehensive capability assessments and health management should be provided for the elderly. Accurate identification of the dynamic care needs of rural elderly individuals is essential to ensure the distribution of welfare subsidies and to effectively leverage the government’s role in providing a safety net. On this basis, differentiated support policies should be implemented, focusing on the near-poor elderly population in rural areas. The coverage of the safety net should be appropriately expanded, and the welfare subsidy standards and actual reimbursement rates for medical insurance for rural elderly individuals who are childless, economically disadvantaged, or severely disabled should be increased.

Secondly, the subsidy standards for rural elderly individuals’ pension insurance should be moderately increased, with supplementary subsidies provided according to regional differences (east, central, and west). Additionally, public welfare funds should be established in accordance with the law for rural elderly individuals who are empty-nesters or disabled, in order to narrow the urban-rural gap. Furthermore, the optimization of the allocation of rural community elderly care service infrastructure should be carried out in an orderly manner. The coverage rate of facilities should be improved, and a sound and sustainable long-term mechanism for the operation of rural community elderly care services should be established. Professional elderly care services from institutions such as nursing homes should be extended to community village committees, with a focus on meeting the basic elderly care needs of rural elderly individuals.

Lastly, the collaborative mechanism of medical consortia in rural areas should be strengthened. Support in terms of technology and talent from higher-level hospitals should be enhanced to

improve the level of primary medical services. With the integration of urban and rural residents' medical insurance and the increase in medical insurance payment fees, the reimbursement catalog and process should be optimized to improve the medical insurance benefits for rural elderly individuals and to increase their awareness of disease prevention and willingness to participate in insurance. The "Five-Community Linkage" should be actively promoted to form a community governance mechanism that is based on the village committee, supported by the village party committee and village committee, uses basic elderly care facilities as carriers, relies on retired party members and volunteers as links, and utilizes charitable organization resources. This mechanism aims to ensure the government's elderly care safety net and to increase social support through multiple forces, meeting the basic elderly care needs of rural elderly individuals, especially those in special difficulty.

4. Conclusion

Aging-friendly rural design is not merely the optimization of spatial forms but also a reconstruction of rural social values. Further exploration is needed in the future.

This study has focused on the design of aging-friendly rural human settlements. Through an in-depth analysis of the current situation and existing problems of rural aging, it has proposed design strategies centered on "cultural heritage and aging-friendly transformation" and constructed a framework for updating rural living environments that balances fairness and locality.

Aging-friendly rural design involves multiple disciplines, including architecture, sociology, psychology, and economics. Future research can strengthen interdisciplinary collaboration to explore the theoretical and practical issues of aging-friendly design from various perspectives. It requires the participation of the government, market, and society. Future research can further investigate how to improve the policy support system, enhance government guidance, promote market operations, and increase social participation to provide strong support for aging-friendly transformation. With the continuous progress of technology, intelligent technologies and new materials have broad application prospects in aging-friendly design. Future research can explore how to introduce new technologies into rural aging-friendly transformation to improve the effectiveness of the transformation and the quality of life for the elderly.

This study provides a useful reference for aging-friendly transformation in the context of rural revitalization. Future research will continue to contribute to the overall improvement of rural elderly care welfare.

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