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Research on the Construction of an Evaluation System for Old Community in Zhanjiang under the All-age Community Model

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Abstract: The All-Age Community Model is an innovative elderly care approach that prioritizes residents of all ages while addressing seniors' needs. It emphasizes the integration of intergenerational harmony and sustainable community development, catering to both physical and psychological requirements. Currently, there is a lack of systematic evaluation frameworks for implementing this model in aging communities. To bridge this gap, this study employs the Analytic Hierarchy Process (AHP) to refine evaluation criteria and indicators, establishing a comprehensive assessment system tailored for Zhanjiang's aging communities. The goal is to shift from evaluating only age-appropriateness to assessing full-age inclusivity, thereby providing a decision-making foundation for fostering intergenerational integration and creating sustainable elderly care environments.

Keywords: All-age community; Existing Zhanjiang communities; Intergenerational cohesion; Analytic Hierarchy Process (AHP); Comprehensive assessment

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1. Introduction

In recent years, China has witnessed rapid development in elderly care infrastructure. However, aging buildings and delayed age-friendly renovations in older communities render existing facilities inadequate for seniors. These facilities fail to align with the behavioral patterns and psychological needs of the elderly. Compounding this issue, the prevalent phenomenon of elderly-to-elderly care within communities exacerbates communication barriers, reduces social interaction, and hinders adaptation to societal changes. This situation intensifiescommunity isolation and deepens intergenerational divides [1].

The All-age Community represents an innovative model of elderly care that transcends traditional single-group focus. By adapting to evolving community demographics and family structures, it addresses the diverse needs of different generations while promoting intergenerational integration and social inclusion. This approach enables seniors to age in place while experiencing the community's enduring vibrancy. When applied to

revitalizing aging neighborhoods, this model incorporates child and middle-aged demographic considerations through aging-friendly research, effectively consolidating social resources and alleviating structural imbalances in elderly care resource allocation.

At present, there are few studies on the evaluation of old communities based on the model of All-age Community. Based on the case study and literature review of All-age Community, combined with the living conditions of residents in old communities in Zhanjiang, this paper constructs an evaluation system of old communities in Zhanjiang which is suitable for the model of All-age Community, and provides theoretical reference and practical basis for the promotion of the renewal of old communities.

2. Rationale and Basis for Constructing the Evaluation System for Zhanjiang's Old Communities under the All-age Community Model

2.1. Methodological Approach

This study employs the Analytic Hierarchy Process (AHP) to establish evaluation indicatorsthrough a dual approach combining qualitative and quantitative analysis with theoretical construction and empirical research [2]. The process unfolds in three phases: First, we analyze domestic and international cases of All-age Community development to identify core elements and establish a preliminary evaluation framework. Second, we systematically review relevant literature to extract and integrate existing evaluation factors, then select initial indicators. Finally, based on the actual living conditions of old communities in Zhanjiang City, we design targeted questionnaires. Through data collection and analysis, we refine the selection of All-age Community evaluation indicators that align with local realities, ultimately constructing a comprehensive, systematic, and targeted evaluation system (**Figure 1**).

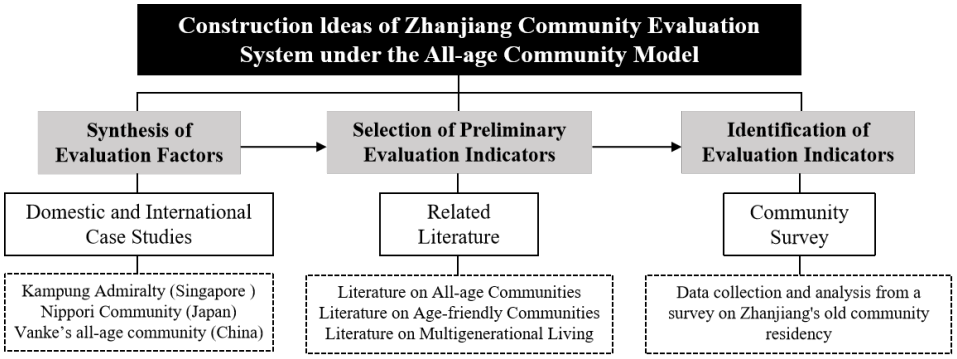

Figure 1. Methodological Approach

2.2. Domestic and International Case Studies of All-Age Community

The All-age Community theory has accumulated substantial practical experience in residential space applications. Germany emphasizes individual autonomy, promoting neighborhood mutual aid and close-knit living models. Influenced by family-oriented values, Asian countries like Japan and Singapore have developed diverse multi-generational cohabitation models. In China, the All-age Community model is primarily reflected in senior housing, with major developers such as Vanke and China Resources achieving notable explorations in this field. Extracting core construction principles and design elements from existing projects forms the foundation for ensuring that evaluation metrics for all-age communities closely align with residents' actual needs (**Table 1)**.

2.2.1. The Kampung Admiralty in Singapore

This innovative vertical community integrates multi-generational living spaces, senior care facilities, intergenerational social areas, and commercial spaces into a single building, creating a one-stop lifestyle through efficient land use. The structure is divided into three sections: the upper section houses senior apartments and a community park, the middle section contains a medical center, while the lower section is designed as gray spaces like a community square. This three-dimensional layout facilitates the interaction and integration of different functional areas, fostering intergenerational engagement.

The community boasts diverse public spaces, all designed with exceptional inclusivity. The ground-floor public square and second-floor dining area interact through visual, spatial, and circulation flows, enhancing spatial vitality and fostering social engagement. The uppercommunity park, featuring tiered terraces, visually connects with the lower community square. The central medical space, integrated with the outdoor natural environment, creates a visual dialogue between elderly and younger residents, strengthening intergenerational interaction. Additionally, the park incorporates children's play areas, providing opportunities for intergenerational interaction between grandparents and grandchildren, effectively leveraging the community's multi-age appeal in aging-friendly development.

2.2.2. The Nippori Community in Japan

The main building of Nikaidori House adopts a vertical functional layout. The ground floor serves as a community public area, while the 2nd and 3rd floors are designed as rental residences for young people or families. Floors 4 to 11 are dedicated to senior living, accommodating both assisted and self-care seniors. This vertical integration of elderly and younger residents effectively fosters intergenerational interaction.

The first floor public space includes multifunctional hall, restaurant, rest room, kindergarten, medical institution and so on. The multifunctional hall is used for the community to hold regular activities, and the rest room can be used as a library. It is adjacent to the kindergarten, so that the elderly can have visual interaction with children when they are resting, and relieve their loneliness.

The residential design features differentiated layouts for seniors with varying physical conditions. Lower floors cater to those requiring nursing care, each equipped with a communal dining area, bathroom, and lounge space, along with a compact kitchen and bathroom. Upper floors accommodate self-reliant seniors with either a 34 m^2 one-bedroom or 91 m^2 two-bedroom unit, complete with a private kitchen and bathroom. These units also include versatile spaces such as a multifunctional room, game room, and rooftop terrace bath, enhancing residents' independence and freedom of movement.

The community regularly organizes various social events, including garden gatherings, tea parties, and reading sessions for seniors and children, to foster interaction between older residents and younger community members. These activities also strengthen intergenerational connections within the community. Additionally, courtyard maintenance and disaster preparedness drills invite participation from neighboring residents and broader communities, enhancing the community's ties with the outside world and increasing its openness.

2.2.3. Vanke's all-age community in China

Vanke developed an idealized community model in Shanghai, focusing on an all-age community-based elderly care system. The proposed site, located in the suburban area of Shanghai's Outer Ring Road, features convenient transportation and comprehensive amenities including medical facilities, educational resources, and commercial

services—all accessible within a 30-minute drive. The community adopts a semi-enclosed layout, with mixed-use residential clusters integrating standard housing and age-friendly residences. At its core are centralized elderly care apartments and institutions, connected internally and externally by a U-shaped elderly care and living support network, along with a vibrant park belt.

In elderly care services, age-friendly housing is integrated into conventional residences to create a mixed-age living model. This approach not only accommodates evolving family structures but also fosters social connections across generations, reducing psychological isolation among seniors. Elderly care facilities are tiered according to physical conditions, including nursing homes, senior apartments, health centers, day care centers, and senior dining halls. These spaces emphasize a family-like atmosphere to minimize the institutional feel and alienation of the environment.

To address the needs of different age groups, children's educational facilities and intergenerational interaction spaces should be introduced into community educational spaces, public areas, and landscape zones. These facilities should be strategically distributed based on usage frequency and service radius. This approach not only meets the daily needs of all age groups and facilitates mixed-age interactions within the community, but also extends its benefits to surrounding neighborhoods, thereby expanding the social engagement opportunities for the elderly.

Table 1. Summary of Elements and Indicators in All-Age Community Case Studies

Project Name	Element	Indicator
The Kampung Admiralty in Singapore	It is equipped with multi-generational living spaces, facilities for the elderly, intergenerational social areas, and commercial facilities.	Meeting All-Age Needs
	The Intersection and Combination of Functional Spaces	Spatial Diversity and Multi-functionality
	Public Space Diversity and Inclusiveness	Intergenerationally Inclusive Spaces
The Nippori Community in Japan	Vertical Mixed Configuration of Elderly and Young Residents	Multigenerational Mixed Living Model
	Public space has the function of intergenerational communication	Spaces for Intergenerational Interaction
	Differentiated apartment design	Adaptability of Residential Unit Layouts
	Regularly organize various types of exchange activities	Organizing Intergenerational Activities
Vanke's all-age community in China	The adaptation of aging-friendly housing to ordinary residential buildings	All-age Mixed Living Model
	The elderly care facilities are allocated according to the physical condition of the elderly.	Hierarchically Configured Facilities
	Introducing children's education facilities and intergenerational communication venues into community education spaces, public spaces, and landscape spaces.	All-age Shared Facilities

2.3. Synthesis of Literature on All-age Community

The literature on All-age Community research has shown a consistent growth trend, attracting significant scholarly attention in recent years. The number of journal articles has steadily increased, with research focus expanding from initial emphasis on the concept of All-age Community development in newly built communities to broader studies on existing community adaptation. This field primarily encompasses three research directions: evaluation systems for all-age communities, studies on constructing new all-age communities, and research on renovating existing all-age communities.

Current research on evaluating old communities within an All-age Community model remains limited. Wu Pinqi et al. conducted a suitability assessment for new all-age community sites across seven dimensions: healthcare, elderly care facilities, transportation, commerce, parks, land pricing, and green spaces [3]. Cao Zheng et al. developed an all-age friendliness evaluation system for aging communities, focusing on six criteria: safety, comfort, accessibility, diversity, recreational value, and cultural relevance [4]. Liu Yang proposed standards for public spaces in aging communities, emphasizing street-life comfort, transportation accessibility, and rich social interactions [5]. Han Xingyu et al. established an all-age friendly evaluation framework for public service facilities in aging communities, covering five dimensions: integrity, safety, comfort, smart technology, and a sense of belonging [6].

Research on the application of All-age Community models primarily focuses on elderly care real estate, examining the planning and architectural design of newly developed senior living communities. Existing domestic practices in this field are predominantly concentrated in elderly care real estate, with major developers like Vanke and Greenland actively promoting and exploring the concept of all-age communities. Studies on constructing new all-age communities generally address material aspects such as user demographics, spatial layout, housing unit types, and supporting facilities, establishing principles and strategies for community development. For instance, Yang Siyuan compared domestic and international research practices in elderly care real estate, analyzed domestic case studies, summarized the strengths and weaknesses of existing models, and proposed construction strategies from three dimensions: policy recommendations, community planning, and service operations [7]. Feng Yixin proposed a "trinity" approach to building all-age communities that integrates emotional support, medical security, and material provisions [8]. Liao Luzhe, after analyzing existing issues, optimized the construction model of all-age communities and proposed a multi-level conceptual framework [9]. Liu Xi not only considered the physical characteristics of elderly residents but also emphasized their psychological needs, conducting psychological analysis of senior demographics to develop all-age senior living communities that meet actual requirements through comprehensive planning, architectural design, facility development, and service systems [10].

In the application of the All-age Community concept, academic circles have gradually initiated theoretical discussions and practical research. Multiple scholars have proposed targeted renewal strategies from dimensions such as spatial transformation and governance mechanisms, combining specific case studies. For instance, Zhang Yu, based on the current issues of old residential communities in Nanchang's unit system, explored community renewal pathways guided by the all-age concept from the perspectives of public spaces including square areas, street spaces, and residential spaces [11]. Lü Mingshu et al., considering the practical background of China's old community renovations, proposed principles such as multi-level coordination, people-oriented approaches, and flexible governance, and established a corresponding all-age renewal strategy system [12]. Wang Yanlu, using Fangxing Community in Hefei, Anhui Province as a case study, systematically proposed all-age renewal strategies applicable to old communities from four dimensions: shared spaces, composite spaces, characteristic spaces, and intergenerational spaces [13].

Through systematic analysis of three classic domestic and international cases and review of 106 highly relevant literature articles, we have preliminarily established the evaluation criteria for old communities under the All-age Community model as: safety and accessibility, comprehensiveness and comfort, mixed-use and sharing, intergenerational interaction, and all-age participation. By integrating theoretical frameworks, we further refined and optimized the connotations of each criterion layer, initially constructing an evaluation index system comprising 5 criterion layers and 24 indicator layers (**Table 2**). This system serves as the foundational framework for subsequent field research to conduct indicator screening and revisions.

Table 2. Preliminary Selection of Evaluation Indicators for Old Communities under All-age Community Model

Criteria Level	Indicator Level
Safety and Accessibility	Residential Space Safety
	Public Space Safety
	Road Traffic Safety
	Full Path Accessibility
	Continuous Access System
Comprehensiveness and Comfort	Spatial Planning Rationality
	Activity Space Adequacy
	Service Facility Completeness
	Landscape Environment Comfort
	Indoor Environment Comfort
Mixed-Use and Sharing	Spatial Layout Hierarchy and Mix
	Housing Unit Adaptability
	Shared Space Distribution Balance
	Facility Sharing and Flexible Allocation
	Space-Time Shared Use Mechanism
Intergenerational Interaction	Multi-Generational Residential Mix
	Intergenerational Interaction Space Support
	Multi-Generational Facility Inclusivity
	Cross-Generational Cooperation Activity
	Intergenerational Cultural Integration
All-Age Participation	All-Age Activity Normalization
	Multiple Stakeholder Participation
	Community Service All-Age Friendliness
	Information Communication and Feedback Channels

2.4. Indicator Screening Based on the Needs of All-age Groups in Zhanjiang's Old Communities

Based on the preliminary theoretical research, to overcome the limitations of purely theoretical evaluation criteria and make them more practical and objective, we conducted fieldwork in the old communities of Chikan, Xiashan, and Mazhang districts in Zhanjiang City. Through direct communication with residents, we accurately gathered the actual needs of all age groups regarding community life, which enabled us to optimize and refine the evaluation criteria.

The study conducted seasonal and temporal surveys of elderly, middle-aged, young, adolescent, and preschool groups within the community through observation, questionnaires, and interviews. The research focused on understanding their genuine needs and spatial usage preferences. First, by observing activity patterns, engagement levels, and frequency across age groups, we identified residents 'behavioral habits and spatial challenges. Second, questionnaires were designed based on these findings to analyze age-specific demands. Finally, interviews were conducted to further explore residents' needs, with key demand terms frequently mentioned in interview transcripts being consolidated and categorized into indicators (**Table 3**).

Table 3. Indicators Derived from the Needs of All-age Groups in Zhanjiang's Old Communities

Group Category	Activity	Demand	Synthesis of Indicators
Elderly Group	Sitting, chatting, walking, working out, meeting, playing chess, shopping, looking after children	Intergenerational shared spaces, gathering spaces, age-friendly facilities, elderly care spaces, and senior learning spaces	Barrier-Free Access Systems, Activity Space Adequacy, Service Facility Completeness, Community Smart Technology Level, Shared Space Distribution Balance, Facility Sharing and Flexible Allocation, Intergenerational Interaction Space Support, Multi-Generational Facility Inclusivity, Community Service All-Age Friendliness, Neighborhood Mutual Aid and Support Network
Middle-aged Group	Fitness, socializing, childcare	Children's Care Space, Intergenerational Communication Space and Community Landscape Greening	
Young Adult Group	Sports, parties, and entertainment	Multi-type fitness spaces, smart facilities, landscape greening, pet spaces, and camping areas	
Adolescent Group	Study, communicate, exercise, play	Children's equipment, natural spaces	
Young Children Group	Play and learn	Infant facilities, fun spaces, and natural classrooms	

Based on field research findings and consultations with relevant experts, the preliminary indicators were refined and revised (**Table 4**). First, regarding indicator supplementation, given the frequent demands for smart facilities and childcare services among community residents, experts suggested that enhanced community intelligence could improve convenience and comfort for all age groups. Additionally, neighborhood mutual aid networks could compensate for existing public service gaps and meet diverse resident needs. Consequently, "Community Smart Technology Level" and "Neighborhood Mutual Aid and Support Networks" were added as evaluation indicators. Second, concerning indicator optimization, the "Multi-Generational Residential Mix" indicator derived from the All-age Community theory faced practical challenges in Zhanjiang's aging communities. Residents showed minimal willingness to exchange apartment layouts for multi-generational living. Experts recommended focusing on residential space flexibility and adaptability to assess aging communities' inclusivity without requiring resident relocations. This indicator could be integrated into the more comprehensive "Housing Unit Adaptability" metric. Finally, some indicators required refinement: "Landscape Environment Comfort" and "Indoor Environment Comfort" could be consolidated into "Physical Environment Comfort", while "Full Path Accessibility" and "Continuous Access System" could be merged into "Barrier-Free Access Systems".

Table 4. Process of Screening and Revising Preliminary Indicators

Preliminary Indicator	Screening and Revision Status
Criteria Level: Comprehensiveness and Comfort	Sub-criteria Level: Added the indicator "Community Smart Technology Level"
Criteria Level: All-Age Participation	Sub-criteria Level: Added the indicator "Neighborhood Mutual Aid and Support Network"
Indicator Level: Multi-Generational Residential Mix	Indicator Level: Integration into "Residential Unit Adaptability"
Indicator Level: Landscape Environment Comfort	Indicator level: Consolidated as "Physical Environment Comfort"
Indicator Level: Indoor Environment Comfort	
Indicator Level: Full Path Accessibility	Indicator level: Consolidated as "Barrier-Free Access Systems"
Indicator Level: Continuous Access System	

3. Construction of an Evaluation System for Zhanjiang's Old Communities under the All-age Community Model

3.1. Hierarchical Structure Model of Evaluation Indicators

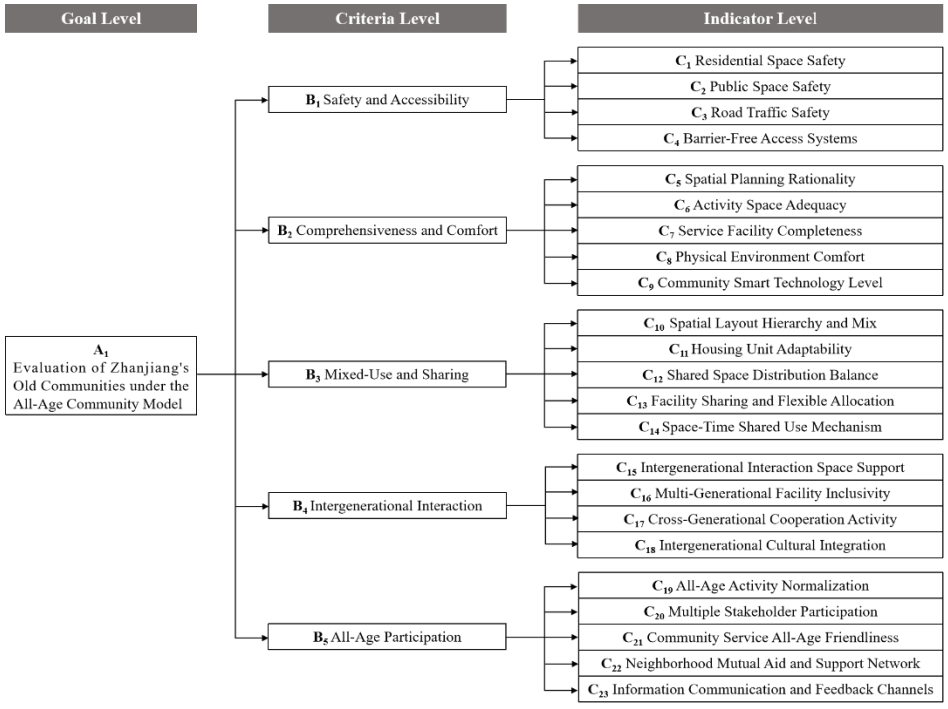

Figure 2. AHP Hierarchy Model of Evaluation Indicators for Zhanjiang's Old Communities under the All-age Community Model

The evaluation system comprises three tiers (**Figure 2**). The target tier is "A_1 Evaluation of Zhanjiang's Old Communities under the All-Age Community Model", while the criterion tier features five key indicators: "B_1 Safety and Accessibility, B_2 Comprehensiveness and Comfort, B_3 Mixed-Use and Sharing, B_4 Intergenerational Interaction, and B_5 All-Age Participation," each corresponding to 23 specific metrics. Specifically: "B_1 Safety and Accessibility" includes "C_1 Residential Space Safety, C_2 Public Space Safety, C_3 Road Traffic Safety, C_4 Barrier-Free Access Systems"; "B_2 Comprehensive Comfort" covers "C_5 Spatial Planning Rationality, C_6 Activity Space Adequacy, C_7 Service Facility Completeness, C_8 Physical Environment Comfort, C_9 Community Smart Technology Level"; "B_3 Mixed-Use and Sharing" involves "C_{10} Spatial Layout Hierarchy and Mix, C_{11} Housing Unit Adaptability, C_{12} Shared Space Distribution Balance, C_{13} Facility Sharing and Flexible Allocation, C_{14} Space-Time Shared Use Mechanism"; "B_4 Intergenerational Interaction" evaluates "C_{15} Intergenerational Interaction Space Support, C_{16} Multi-Generational Facility Inclusivity, C_{17} Cross-Generational Cooperation Activity, C_{18} Intergenerational Cultural Integration "; and "B_5 All-Age Participation" assesses "C_{19} All-Age Activity Normalization, C_{20} Multiple Stakeholder Participation, C_{21} Community Service All-Age Friendliness, C_{22} Neighborhood Mutual Aid and Support Network, C_{23} Information Communication and Feedback Channels."

3.2. Weight Calculation of Evaluation Indicators

Based on the hierarchical structure model, we constructed a criterion layer judgment matrix and five indicator layer judgment matrices (**Figure 3**). Here, A_1 represents the Goal Level : Evaluation of Zhanjiang's Old Communities

under the All-Age Community Model, B_1-B_5 denote the five criterion layers, and C_1-C_{23} represent the indicator layers. To ensure the decision-making results are more objective and universal, the six judgment matrices were assigned values through a 1-9 importance scale method jointly conducted by designers, experts in the universal-age field, and community residents.

A	B_1	B_2	B_3	B_4	B_5
B_1	1	2	2	3	3
B_2	1/2	1	2	2	2
B_3	1/2	1/2	1	1/3	1/3
B_4	1/3	1/2	3	1	2
B_5	1/3	1/2	3	1/2	1

B_1	C_1	C_2	C_3	C_4
C_1	1	2	2	4
C_2	1/2	1	1/2	3
C_3	1/2	2	1	2
C_4	1/4	1/3	1/2	1

B_2	C_5	C_6	C_7	C_8	C_9
C_5	1	2	2	2	5
C_6	1/2	1	3	1/2	4
C_7	1/2	1/3	1	1/3	2
C_8	1/2	2	3	1	2
C_9	1/5	1/4	1/2	1/2	1

B_3	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}
C_{10}	1	2	2	3	4
C_{11}	1/2	1	1/2	1/2	3
C_{12}	1/2	2	1	2	3
C_{13}	1/3	2	1/2	1	2
C_{14}	1/4	1/3	1/3	1/2	1

B_4	C_{15}	C_{16}	C_{17}	C_{18}
C_{15}	1	1/2	3	3
C_{16}	2	1	2	3
C_{17}	1/3	1/2	1	1/2
C_{18}	1/3	1/3	2	1

B_5	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}
C_{19}	1	2	1/2	1/2	1/2
C_{20}	2	1	1/2	1/2	1/2
C_{21}	2	2	1	3	2
C_{22}	2	2	1/3	1	2
C_{23}	2	2	1/2	1/2	1

Figure 3. Judgment Matrices for the Criteria and Indicator Levels

The five criterion layers carry weights of 0.3634,0.2282,0.0917,0.1794, and 0.1372 respectively. The consistency test yielded a maximum eigenvalue λ_{max}=5.3747, with CR=CI/RI=0.0836<0.10, confirming compliance with the consistency test. Similarly, the maximum eigenvalues λ_{max} for each indicator layer are 4.1179,5.2856,5.1846,4.2153, and 5.2866 respectively. All final CR values remain below 0.10, demonstrating that the judgment matrices for each indicator layer pass the consistency test. The hierarchical ranking results are thus objective and valid (**Table 5**).

Table 5. Weights of Indicators in the Evaluation System for Zhanjiang's Old Communities under the All-age Community Model

Target Layer (A)	Guideline Level (B)	Weight (W)	Indicator layer (C)	Weight (W)
Evaluation of Zhanjiang's Old Communities under the All-Age Community Modell	B_1 Safety and Accessibility	0.3634	C_1 Residential Space Safety	0.4295
			C_2 Public Space Safety	0.2066
			C_3 Road Traffic Safety	0.2649
			C_4 Barrier-Free Access Systems	0.0990
	B_1: Consistency Ratio (CR):0.0442; λ_{max}: 4.1179			
	B_2 Comprehensiveness and Comfort	0.2282	C_5 Spatial Planning Rationality	0.3522
			C_6 Activity Space Adequacy	0.2143
			C_7 Service Facility Completeness	0.1106
			C_8 Physical Environment Comfort	0.2517
			C_9 Community Smart Technology Level	0.0712
	B_2: Consistency Ratio (CR):0.0638; λ_{max}: 5.2856			
	B_3 Mixed-Use and Sharing	0.0917	C_{10} Spatial Layout Hierarchy and Mix	0.3734
			C_{11} Housing Unit Adaptability	0.1456
			C_{12} Shared Space Distribution Balance	0.2446
			C_{13} Facility Sharing and Flexible Allocation	0.1634
			C_{14} Space-Time Shared Use Mechanism	0.0729
	B_3: Consistency Ratio (CR):0.0412; λ_{max}: 5.1846			
	B_4 Intergenerational Interaction	0.1794	C_{15} Facility Sharing and Flexible Allocation	0.3168
			C_{16} Multi-Generational Facility Inclusivity	0.4123
			C_{17} Cross-Generational Cooperation Activity	0.1204
			C_{18} Intergenerational Cultural Integration	0.1505
	B_4: Consistency Ratio (CR):0.0806; λ_{max}: 4.2153			
	B_5 All-Age Participation	0.1372	C_{19} All-Age Activity Normalization	0.1372
			C_{20} Multiple Stakeholder Participation	0.1045
			C_{21} Community Service All-Age Friendliness	0.3538
			C_{22} Neighborhood Mutual Aid and Support Network	0.2243
			C_{23} Information Communication and Feedback Channels	0.1802
	B_5: Consistency Ratio (CR):0.0640; λ_{max}: 5.2866			
A: Consistency Ratio (CR):0.0836; λ_{max}: 5.3747				

3.3. Results and Analysis of Evaluation Weighting

The weight distribution results of criterion layers in **Table 5** reveal that in Zhanjiang's old community evaluation system under the universal-age model, the importance ranking of five criterion factors is: "B_1 Safety and Accessibility" (0.3634)> "B_2 Comprehensiveness and Comfort" (0.2282)> "B_4 Intergenerational Interaction"

(0.1794)> "B_5 All-Age Participation" (0.1372)> "B_3 Mixed-Use and Sharing" (0.0917). Notably, the "Safety and Accessibility" factor carries the highest weight, demonstrating its dominant role in evaluating universal-age adaptation of aging communities and serving as the core metric for assessing Zhanjiang's community transformation. The "Comprehensiveness and Comfort" factor also holds significant weight, highlighting the crucial role of spatial quality and infrastructure in successful universal-age adaptation. Both "Intergenerational Interaction" and "All-Age Participation" are indispensable elements in this evaluation system, significantly influencing the degree of community universalization. The relatively lower weight assigned to "Mixed-Use and Sharing" reflects practical considerations regarding Zhanjiang's current renovation phase and community realities, ensuring the evaluation system's higher applicability in real-world implementation.

When applying this evaluation framework, each indicator within the system serves as a core assessment element. Through itemized scoring and weighted calculation, we derive weighted scores for each component, ultimately synthesizing them into a comprehensive evaluation metric for the aging population ratio in old communities. This system proves effective not only for internal assessments of individual communities but also for cross-community comparative analyses. The evaluation results systematically reveal the current status and characteristics of aging population development in Zhanjiang's old communities, providing actionable strategies for future renovations. These insights will drive holistic optimization and quality enhancement of these communities.

4. Conclusion

The all-age transformation of aging communities serves as an effective approach to transcend single-age adaptation and mitigate intergenerational barriers. Grounded in the All-age Community model theory, this study employs the Analytic Hierarchy Process (AHP) to develop an evaluation framework for Zhanjiang's aging communities, comprising 5 criterion levels and 23 indicator levels. This system not only systematically integrates core elements of all-age communities but also incorporates regional considerations in its indicator design, aligning with Zhanjiang's actual conditions and enhancing applicability. As Zhanjiang's urban development and community needs evolve dynamically, the framework's indicator content and weighting should be continuously refined to provide more valuable assessment tools and decision-making references for the ongoing transformation of aging communities.

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