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Evaluation of Aging-Friendly Public Spaces in Old Urban Communities Based on IPA Method—A Case Study of Shouyi Community in Wuhan

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Abstract: In recent years, the aging population in Chinese cities has become increasingly severe. In 2021, the proportion of people aged 65 and above in Wuchang District, Wuhan reached 24.38%, indicating a deeply aging society. Consequently, the importance of studying aging-friendly public spaces in communities is becoming more prominent. This research was conducted based on survey data of outdoor spaces in Shouyi Community, Shouyi Road. Factor analysis and IPA were used to assess the satisfaction and importance of elderly residents' satisfaction. The primary renovation factors identified include route organization, site height difference protection, barrier-free design, plant color matching, plant configuration, and landscape features, followed by spatial continuity, lighting, microclimate, and rest facilities layout. These analyses effectively identified public factors and prioritize the aging-friendly renovation of public spaces in old communities. In the renovation of old communities in Wuhan, safety is the primary renovation factor for aging-friendly communities. Improving site height difference protection and barrier-free facilities significantly enhances residents' satisfaction. The aesthetic improvement of outdoor spaces is the second renovation factor, indicating that the elderly increasingly value the aesthetic aspect of spaces. Although accessibility of community public spaces is the third renovation factor, route organization at the criterion level has the highest priority. Road traffic and parking difficulties are also key factors in the renovation of old communities.

Keywords: suitable for aging; old communities; aging-friendly public spaces; satisfaction; IPA method; renovation priority; Wuhan city

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1. Introduction

According to data released by the China National Bureau of Statistics in 2022, as of the end of 2021, the population aged 65 and over in China has accounted for 14.2% of the general population [1]. Compared to 8.9% in 2010, the proportion of the population aged 65 and over has increased by 5.3% [1], indicating that the aging trend in China is becoming increasingly severe. Compared to the national average, cities, especially old urban districts, show a more severe aging pattern. Data released by the Wuhan Municipal Bureau of Statistics in 2022 show that as of the end of 2021, the population aged 65 and over in Wuchang District, Wuhan accounted for 18.7% of the population, which is 4.5% higher than the national average [2]. With the arrival of an aging society, the demand for public spaces in urban communities by the elderly is also increasing. Community public spaces are one of the main places for the daily activities of the elderly, and the quality of aging-friendly construction directly affects the quality of life and health of the elderly. Due to the numerous content categories and wide scope involved in the renovation and upgrading of old residential communities, comprehensive renovation must be prioritized and phased gradually due to limitations of time, funding, and resources. Based on this,

this study combines resident satisfaction and importance analysis (IPA) and uses Shouyi Community in Wuhan as a case study to carry out theoretical and empirical analysis of the comprehensive renovation priorities of old residential communities. Firstly, factor analysis is used to extract aging-friendly factors that affect resident satisfaction; then, the IPA method is applied to conduct an empirical analysis of the research subjects to determine the content strategies and measures for the aging-friendly renovation of community public spaces.

The study of aging-friendly public spaces in communities has become a hot topic in academia. Scholars generally believe that there is a close relationship between the outdoor public space environment of residential areas and the daily activities of the elderly. Robert B [3] and Peter Henry [4] used social psychology research methods to study the activity characteristics of community residents in Illinois. They investigated the design of roads and parks and proposed design requirements for the mental health and group integration of the elderly. Hamersma M et al. [5] conducted a questionnaire survey on community accessibility satisfaction, summarized the items that hinder road accessibility, and constructed a systematic model to analyze improvement methods. Wood, GER et al. employed a citizen social science (CSS) research method, encouraging older adults and stakeholders in Birmingham, UK, to participate in discussions, collectively proposing ideas and solutions to enhance local urban environments [6]. Hawkesworth, S et al. investigated the association between objectively measured PA and multiple dimensions of the built environment. The results suggested that older individuals are less affected by their local physical environment but more by social environmental factors [7].

Existing satisfaction survey models are already systematic, mainly including the objective Campbell [8] model and the subjective importance–performance analysis (IPA) model. The research methods include data-driven and theory-driven research. In objective research, one approach is to investigate environmental hard indicators, such as Ostrom E's investigation of the construction and materials of buildings, analyzing people's satisfaction with facilities [9]. Another approach is to analyze objectively existing data to understand satisfaction, such as Ellis's use of GIS to collect spectral data on community vegetation coverage at Texas A&M University [10], studying satisfaction with community greening. In subjective research, Parkes, etc. [11], analyzed and understood community residents' satisfaction with safety, comfort, and environmental perception of community spaces through a questionnaire survey of UK housing data from 1997 to 1998. Subjective and objective research compare the differences between research factors and satisfaction evaluation to seek community renovation methods. Additionally, there are studies combining subjective and objective research. For example, Yizhao Yang [12] collected objective data on housing conditions, land use rates, street networks, etc., and subjective evaluations from communities, using multi-level linear models to analyze satisfaction. Andrea [13] used the IPA model and the three-element theory to determine the focus of community improvement in Dunedin, New Zealand. Roberts, H, etc. [14], used direct observation to examine park features and employed multilevel linear regression analysis to explore the interactions between park features, ethnicity, and socioeconomic status. In the "Journal of Urban Management", Kurt Matzler [15] used an importance–performance analysis to accurately identify customer needs through the factor structure of customer satisfaction; Cao X [16] applied the IPA–Kano model to examine the environmental relevance of residential satisfaction and conducted a principal component analysis of related factors.

China entered the aging stage in 2000. The study of aging-friendly life for the elderly has become a hot topic in relevant professional fields, and scholars have begun to study the relationship between people and spaces. For example, Yuan Laibin [17] used statistical analysis of Likert scales and fuzzy comprehensive evaluation methods to score community facilities and study community satisfaction. Zhang Chun and Chai Yanwei [18] conducted a survey of community satisfaction among the elderly in Beijing, classifying community factors from the perspective of satisfaction and attention. Moreover, they analyzed the causes of factors in the low attention–low satisfaction quadrant through fuzzy evaluation.

Li Zhigang [19] analyzed the residential satisfaction of "new immigrants" in Chinese cities as well as its influencing factors through field survey data obtained in Beijing, Shanghai, and Guangzhou. Lv Fei [20], etc., used factor analysis and IPA to analyze the renovation priorities of resident satisfaction in three communities in Harbin, effectively identifying the public factors and their priority ranking in the comprehensive renovation of old residential communities. Zhao Dongxia [21] conducted empirical research on the factors of community satisfaction among residents using POE, finding the relationships of factors improving satisfaction through principal component analysis. Zhan Dongsheng [22] and Zhu Xiaolei [23] studied the subjective evaluation factors of old community residents on the public space environment by combining psychological analysis. Geng Jinhua [24] used the three-element theory to analyze the coefficient influence status of ornamental, accessibility, and safety factors of community satisfaction in Qingdao using questionnaire data based on a simultaneous equation model.

2. Materials and Methods

2.1. Study Area

Wuhan is an early urbanized city in central China. According to the Wuhan Statistical Yearbook (2022), as of 2021, the permanent population of Wuhan has reached 9,341,016, of which 1,989,510 were aged 60 and above, accounting for 21.3%. The Shouyi Road Street in Wuchang District has a permanent population of 55,395, with 17,589 people aged 60 and above, accounting for 31.8% [2]. This degree of aging far exceeds the average level in Wuhan, making it a typical area with a severely aging population.

The present study focuses on Shouyi Community on Shouyi Road Street in Wuchang District, Wuhan. Shouyi Community was built in the 1980s and is one of the earliest centrally constructed residential areas in Wuhan. Since 2019, Wuhan has successively carried out renovations of old communities. The renovation work for Shouyi Community includes drainage facilities, electrical lines, parking facilities, functional rooms, damaged roads, building facades, roofs, stairwells, streetlights, and the addition of fitness, rest, security monitoring, fire protection, and waste classification facilities. This study evaluates the aging-friendly aspects of the public spaces in Shouyi Community (Figure 1).

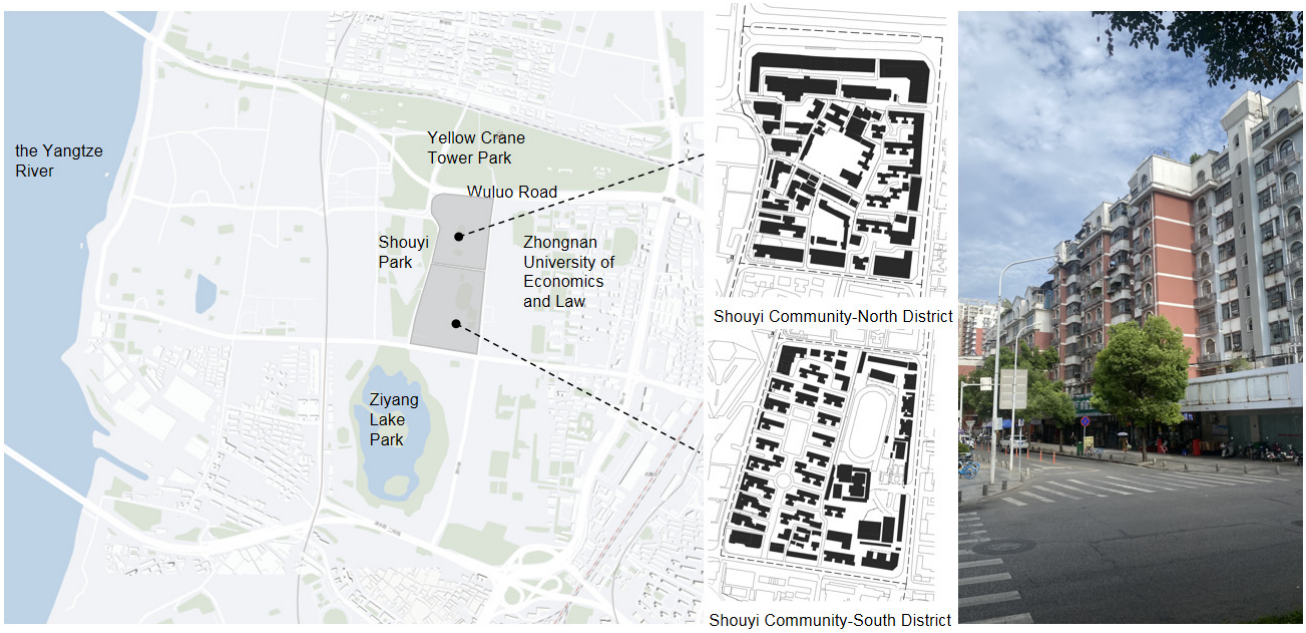

Figure 1. Current status of Shouyi Community. (Drawn by the author, Map get from Weisi WGIS platform http://mywis.cn/wislayers, accessed on 18 July 2024).

Explanation: Shouyi Community was established in the 1980s and is divided into the northern and southern sections, covering a total area of 21.6 hectares. The community has a total of 5514 households and a population of 12,149 people. It is one of the first pilot residential areas under China's affordable housing project.

2.2. Establishing Evaluation Indicators

Through on-site observation, questionnaire surveys, and face-to-face interviews in Shouyi Community on Shouyi Road Street, this study identified several issues in the public environment and facilities such as narrow roads, insufficient parking spaces for motor vehicles, lack of safety protection facilities, damaged streetlights, unreasonable and poorly maintained outdoor activity facilities. The goal of this study is to deeply understand the importance and satisfaction evaluation of aging-friendly factors in community spaces for the elderly and to analyze the aging-friendly status of old communities. We used the method employed in the literature, collecting evaluation factors from related papers on aging-friendly evaluations [25,26]. Based on scholar evaluations of aging-friendly content, and combined with preliminary observations, we initially determined the evaluation factors. Using the expert interview method, we collected opinions from 15 experts, including 4 architecture experts, 7 urban and rural planning experts, and 2 other experts. These experts rated the aging-friendly factors using a Likert five-point scale, with scores ranging from 1 (unimportant) to 5 (very important) (Table 1).

Table 1. Formula for screening aging-friendly factors.

Formula	Name
$M = \frac{1}{n}\sum_{1}^{n} X_i$	Mean
$SD = \sqrt{\frac{\sum_{i=1}^{n} (X_i - M)^2}{n-1}}$	Standard Deviation
$C_v = \frac{SD}{M}$	Coefficient of Variation

M—mean value of expert satisfaction survey; X—value of satisfaction survey; SD—standard deviation of aging-friendly factors; Cv—coefficient of variation of aging-friendly factors; n—number of valid questionnaires.

We calculated the questionnaire data to obtain the mean, standard deviation, and coefficient of variation for each aging-friendly factor (Table 2). Based on the mean values of the factors, we retained factors with a mean value ≥ 3. The selected 18 indicator factors formed the evaluation system for community public space construction. This system evaluates both satisfaction and importance of aging-friendly construction in community public spaces at two levels: the criterion level and the indicator level.

Table 2. Expert ratings of aging-friendly factors.

Factor Name	Mean	Coefficient of Variation	Standard Deviation	Factor Name	Mean	Coefficient of Variation	Standard Deviation
Material Safety	4.94	0.18	0.58	Route Organization	3.99	0.17	0.67
Environmental Hygiene	4.81	0.17	0.67	Spatial Continuity	3.97	0.13	0.83
Paving Material Safety	4.67	0.11	0.61	Microclimate	3.81	0.17	0.47
Rest Facility Layout	4.66	0.17	0.87	Walking Distance	3.80	0.17	0.77
Barrier-Free Design	4.65	0.14	0.53	Site Elevation	3.72	0.18	0.38

Table 2. *Cont.*

Factor Name	Mean	Coefficient of Variation	Standard Deviation	Factor Name	Mean	Coefficient of Variation	Standard Deviation
Lighting	4.53	0.18	0.8	Site Distribution	3.71	0.19	0.69
Plant Color Matching	4.52	0.13	0.73	Landscape Scale	3.3	0.12	0.72
Plant Selection Safety	4.43	0.16	0.66	Shading Facilities	2.65	0.16	0.76
Plant Configuration	4.22	0.19	0.49	Winter Landscape	2.35	0.16	0.46
Landscape Features	4.01	0.28	0.48	Noise Reduction Design	2.32	0.15	0.55
Spatial Recognizability	4.00	0.17	0.57	Site Types	2.26	0.15	0.55

The 18 factors were classified into four criterion level indicators: Accessibility (A), Safety (B), Comfort (C), and Aesthetics (D). Among them, Accessibility (A) includes 5 factors, Safety (B) includes 6 factors, Comfort (C) includes 4 factors, and Aesthetics (D) includes 3 factors. These factors are designed to comprehensively assess the aging-friendly status of community public spaces and provide strong support for improving the quality of life of the elderly (Table 3).

Table 3. Satisfaction–importance evaluation system for aging-friendly public spaces in old communities.

Criterion Level	Indicator Level	Remarks
Accessibility (A)	Route Organization (1)	Impact of carriageways on sidewalks
	Spatial Recognizability (2)	Layout of standard systems
	Spatial Continuity (3)	Smoothness of roads
	Walking Distance (4)	Walking distance to activity sites
	Site Distribution (5)	Even distribution of living spaces
Safety (B)	Material Safety (6)	Material of facilities is smooth without sharp protrusions
	Site Elevation Protection (7)	Protection facilities for site elevations >30cm
	Plant Selection Safety (8)	Plants without irritating odors, non-thorny, not tripping hazards
	Paving Material Safety (9)	Non-slip, sturdy, flat floor tiles
	Barrier-Free Design (10)	Ramps and handrails at steps
	Lighting (11)	Brightness and softness coverage of streetlights
Comfort (C)	Environmental Hygiene (12)	Sanitation of activity areas
	Microclimate (13)	Comfort while being active in the site (e.g., no exposure to direct sunlight, not in wind tunnels)
	Rest Facility Layout (14)	Number and distribution of seats in the site
	Landscape Space Scale (15)	Space area meets activity needs
Aesthetics (D)	Plant Color Matching (16)	Richness of plant colors
	Plant Configuration (17)	Aesthetic plant arrangement
	Landscape Features (18)	Decorative sculptures, art installations, etc.

2.3. Research Methods

During the survey, elderly residents aged 60 and above from Shouyi Community were randomly invited to evaluate the public spaces. A total of 85 questionnaires were distributed, with 72 valid responses. The survey was conducted in three time periods: morning, noon, and evening on 1–5 April, 12–16 April, and 1–4 May 2024. The questionnaire assessed the satisfaction and importance of 18 aging-friendly factors in community spaces. Reliability analysis of the 85 questionnaires using SPSS scale test excluded 13 questionnaires, resulting in 72 valid responses (84.7%). There were 18 items for importance and 18 for satisfaction, totaling 36 items.

SPSS25.0 software was used for the data analysis to obtain the mean values of satisfaction and importance evaluations of the elderly regarding the aging-friendly status of old community spaces. These mean values were compared horizontally with the Likert satisfaction scale to reveal issues in community aging-friendly aspects. Using the IPA model, we compared factor satisfaction and importance vertically (Figure 2). Finally, optimization strategies for public spaces in old communities were proposed from the perspectives of accessibility, safety, comfort, and aesthetics.

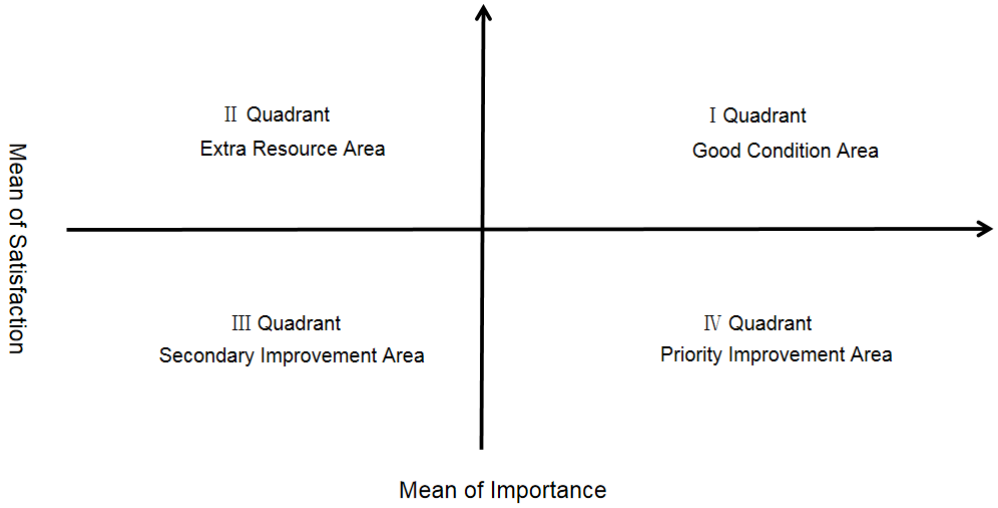

Figure 2. IPA Scatter Plot.

Through the above research methods, we gained an in-depth understanding of the elderly's evaluations of the satisfaction and importance of aging-friendly factors in community spaces and analyzed the aging-friendly status of old communities. These results provide important reference value for improving the quality of life of the elderly and enhancing the aging-friendly level of public spaces in communities.

3. Results

3.1. IPA of Satisfaction–Importance for Aging-Friendly Construction in Public Spaces at the Criterion Level

After processing the questionnaire data with SPSS, it was found that among the four criterion level indicators—Accessibility, Safety, Comfort, and Aesthetics—elderly residents in the community consider Safety (B) the most important, followed by Aesthetics (D), Comfort (C), and Accessibility (A), in decreasing order of importance. In terms of satisfaction, Accessibility (A) has the highest satisfaction, approaching a satisfactory level (4 points), followed by Comfort (C), Safety (B), and Aesthetics (D), in decreasing order of satisfaction (Table 4 and Figure 3).

Table 4. Paired samples t-test statistics for criterion level.

Dimension	Satisfaction (P)		Importance (I)		Mean Difference (P-I)	t-Value	*p*-Value
	Mean	Rank	Mean	Rank			
Accessibility (A)	3.672	1	3.444	4	0.2278	2.885	0.007
Safety (B)	2.801	3	4.102	1	−1.300925926	−19.136	0
Comfort (C)	3.111	2	3.764	3	−0.65278	−9.152	0
Aesthetics (D)	2.343	4	3.824	2	−1.481481481	−11.929	0

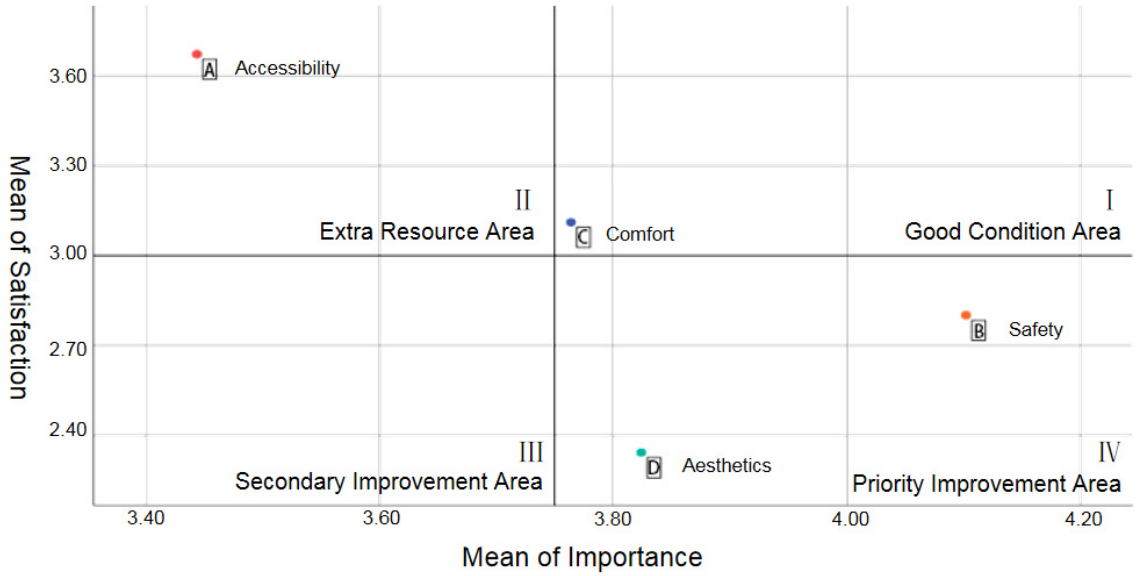

Figure 3. IPA Scatter Plot at Criterion Level.

From the criterion level IPA model diagram, we can see the following:

1. Accessibility (A) is in the high satisfaction–low importance quadrant, indicating that Accessibility is considered of low importance but has high satisfaction among the elderly in the community.
2. Safety (B) and Aesthetics (D) are in the low satisfaction–high importance priority improvement quadrant, indicating that Safety and Aesthetics are urgent issues that need to be addressed in the aging-friendly construction of public spaces in Shouyi Community.
3. Comfort (C) is in the high satisfaction–high importance quadrant, indicating that Comfort is generally good.

3.2. IPA of Satisfaction–Importance for Aging-Friendly Construction in Public Spaces at the Indicator Level

Through processing the questionnaire data for the 18 indicators at the indicator level with SPSS, it was found that in terms of importance, there are three indicators—Site Elevation Protection (7), Plant Selection Safety (8), and Paving Material Safety (9), indicating an importance score > 4—that are considered the most important by the elderly in the community. Other indicators scored between 3 and 4, indicating slightly lower importance.

In terms of satisfaction, the scores for Route Organization (1), Spatial Continuity (3), Site Elevation Protection (7), Lighting (11), Microclimate (13), Plant Configuration (17), and Landscape Features (18) range between 3 and 4, indicating relatively low satisfaction among the elderly in the community. Barrier-Free Design (10) and Plant Color Matching (16) have the lowest satisfaction, with scores between 1 and 2 (Table 5 and Figure 4.).

Table 5. Paired samples t-test statistics for indicator level.

Criterion Level	Factor	Satisfaction (P) Mean	Importance (I) Mean	Mean Difference (P-I)	t-Value	*p*-Value
Accessibility (A)	Route Organization (1)	2.72	3.83	−1.111	−6.809	0
	Spatial Recognizability (2)	4.39	3.33	1.056	8.402	0
	Spatial Continuity (3)	2.75	3.33	−0.583	−4.004	0
	Walking Distance (4)	4.22	3.39	0.833	7.174	0
	Site Distribution (5)	4.28	3.33	0.944	8.996	0

Table 5. *Cont.*

Criterion Level	Factor	Satisfaction (P) Mean	Importance (I) Mean	Mean Difference (P-I)	t-Value	*p*-Value
Safety (B)	Material Safety (6)	3.67	3.56	0.111	0.813	0.422
	Site Elevation Protection (7)	2.00	4.33	−2.333	−22.136	0
	Plant Selection Safety (8)	4.19	4.33	−0.044	−0.439	0.781
	Paving Material Safety (9)	4.25	4.33	−0.083	−0.649	0.52
	Barrier-Free Design (10)	1.69	4.42	−2.722	−16.765	0
	Lighting (11)	2.31	3.64	−1.333	−10.583	0
Comfort (C)	Environmental Hygiene (12)	4.56	3.74	0.819	8.57	0.452
	Microclimate (13)	2.76	3.72	−1.061	−8.714	0.01
	Rest Facility Layout (14)	3.50	3.56	−0.062	−0.631	0
	Landscape Space Scale (15)	3.53	3.83	−0.306	−3.584	0
Aesthetics (D)	Plant Color Matching (16)	1.67	3.81	−2.139	−14.803	0
	Plant Configuration (17)	2.89	3.81	−0.917	−6.068	0
	Landscape Features (18)	2.47	3.86	−1.389	−10.381	0

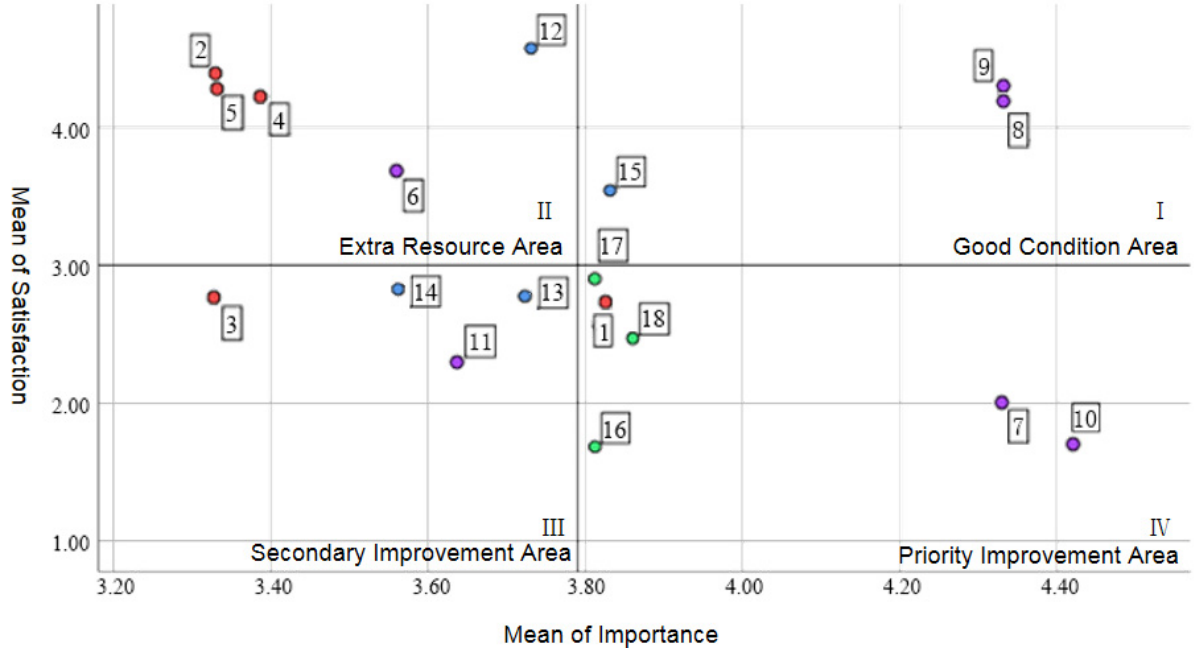

Figure 4. IPA scatter plot at indicator level.

Analyzing the IPA scatter plot for the indicator level in Shouyi Community (Figure 4) leads to Table 6:

Table 6. Priority order of indicator level factors.

Priority Improvement Factors	Secondary Improvement Factors
Route Organization (1)	Spatial Continuity (3)
Site Elevation Protection (7)	Lighting (11)
Barrier-Free Design (10)	Microclimate (13)
Plant Color Matching (16)	Rest Facility Layout (14)
Plant Configuration (17)	
Landscape Features (18)	

4. Discussion

4.1. Accessibility Analysis

Analyzing the Paired Samples T-Test Statistics for Accessibility Indicators (Table 7) and the IPA scatter plot for the Accessibility Criterion Level (Figure 5), factors 2 (Spatial Recognizability), 4 (Walking Distance), and 5 (Site Distribution) are in the high satisfaction–low importance quadrant, indicating high satisfaction among elderly residents. Factor 1 (Route Organization) is in the low satisfaction–high importance priority improvement quadrant. Factor 3 (Spatial Continuity) is in the secondary improvement quadrant, suggesting that there is still room for optimization in route organization and spatial continuity. The on-site visits revealed that the integration of community motorways is relatively high. Elderly residents believe that narrow roads, discontinuous sidewalks, and random parking of motor vehicles are the main reasons for the disruption of route organization and spatial continuity in the community (Figure 6).

Table 7. Paired samples t-test statistics for Accessibility Indicators.

Criterion Level	Factor	Satisfaction (P) Mean	Importance (I) Mean	Mean Difference (P-I)	t-Value	*p*-Value
Accessibility (A)	Route Organization (1)	2.72	3.83	−1.111	−6.809	0
	Spatial Recognizability (2)	4.39	3.33	1.056	8.402	0
	Spatial Continuity (3)	2.75	3.33	−0.583	−4.004	0
	Walking Distance (4)	4.22	3.39	0.833	7.174	0
	Site Distribution (5)	4.28	3.33	0.944	8.996	0

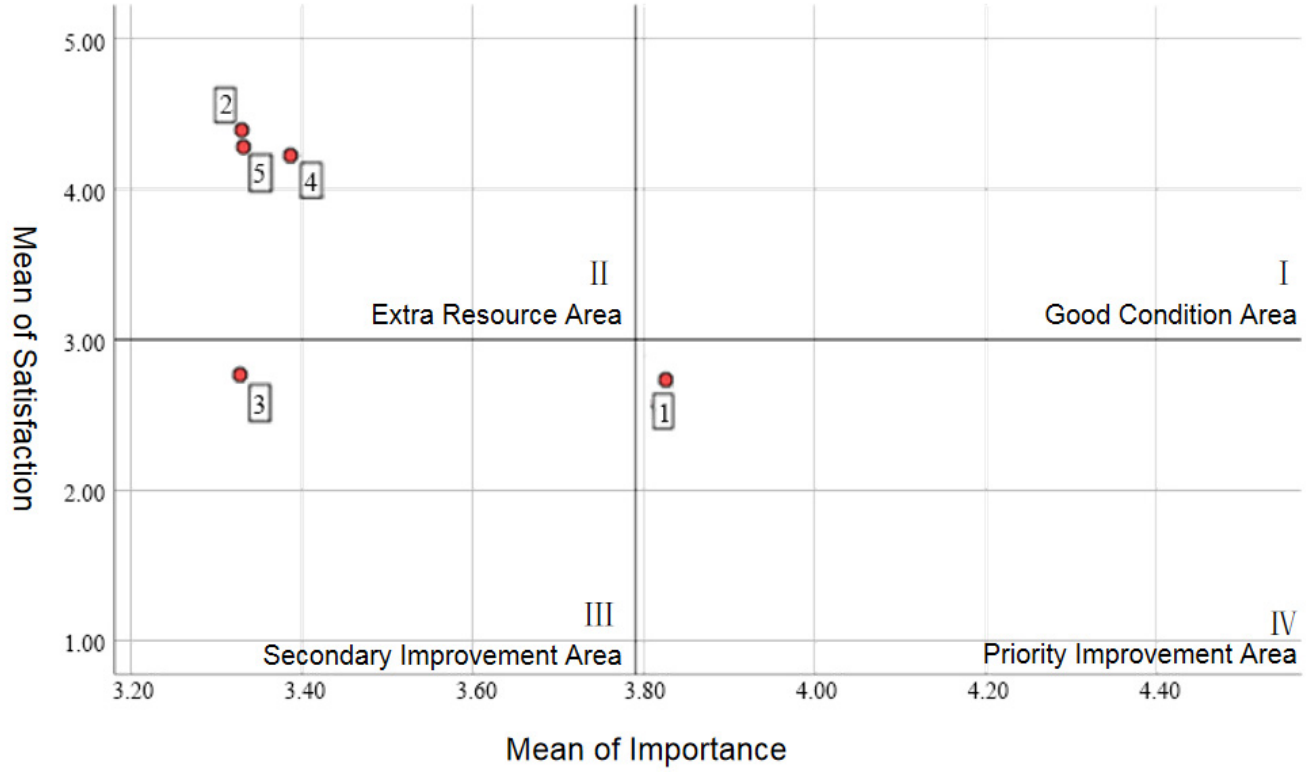

Figure 5. IPA scatter plot for Accessibility Criterion Level.



Figure 6. Community walkway. (Drawn by the author, Map get from Weisi WGIS platform http://mywis.cn/wislayers, accessed on 18 July 2024).

4.2. Safety Analysis

Analyzing the Paired Samples T-Test Statistics for Safety Indicators (Table 8) and the IPA scatter plot for Safety Criterion Level (Figure 7), the six safety indicators, factors 8 (Plant Selection Safety) and 9 (Paving Material Safety) are in good condition, while factor 6 (Material Safety) is in the extra resources quadrant, indicating high satisfaction among elderly residents for these three indicators. Factor 11 (Lighting) is in the secondary improvement quadrant, while factors 7 (Site Elevation Protection) and 10 (Barrier-Free Design) need major improvement.

Table 8. Paired samples t-test statistics for Safety Indicators.

Criterion Level	Factor	Satisfaction (P) Mean	Importance (I) Mean	Mean Difference (P-I)	t-Value	*p*-Value
Safety (B)	Material Safety (6)	3.67	3.56	0.111	0.813	0.422
	Site Elevation Protection (7)	2.00	4.33	−2.333	−22.136	0
	Plant Selection Safety (8)	4.19	4.33	−0.044	−0.439	0.781
	Paving Material Safety (9)	4.25	4.33	−0.083	−0.649	0.52
	Barrier-Free Design (10)	1.69	4.42	−2.722	−16.765	0
	Lighting (11)	2.31	3.64	−1.333	−10.583	0

The on-site surveys revealed that Shouyi Community is crowded with significant elevation changes. Interviews revealed that elderly residents consider the excessive elevation differences between some roads and sidewalks, and the lack of safety protection facilities in some elevated areas, and discontinuous barrier-free facilities to be the main factors affecting site safety (Figure 8). Regarding lighting, the insufficient brightness at night and incomplete streetlight coverage causes difficulties for elderly residents when traveling at night.

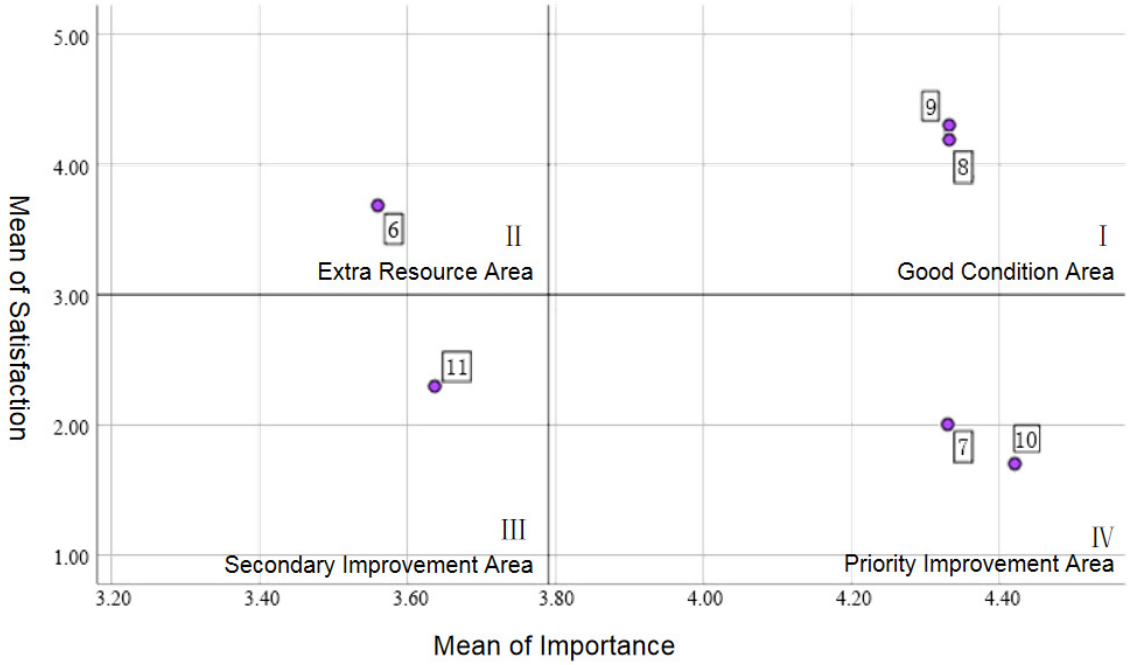

Figure 7. IPA Scatter Plot for Safety Criterion Level.



Figure 8. The road lacks accessibility facilities. (Photo by the Author).

4.3. Comfort Analysis

Analyzing the Paired Samples T-Test Statistics for Comfort Indicators (Table 9) and the IPA scatter plot for Comfort Criterion Level (Figure 9), among the four comfort indicators in public spaces, elderly residents rate community environmental hygiene highly but microclimate poorly. This is mainly due to the lack of shading facilities in public spaces, which fail to meet the protection needs during summer and rainy seasons (Figure 10). Regarding the layout of rest facilities, elderly residents believe that the distribution of rest facilities is balanced, but some facilities are improperly placed, causing inconvenience in use and lacking maintenance (Figure 11). In terms of the landscape space scale, elderly residents feel that the space is small, and many areas are occupied by vehicles.

Table 9. Paired samples t-test statistics for Comfort Indicators.

Criterion Level	Factor	Satisfaction (P) Mean	Importance (I) Mean	Mean Difference (P-I)	t-Value	*p*-Value
Comfort (C)	Environmental Hygiene (12)	4.56	3.74	0.819	8.57	0.452
	Microclimate (13)	2.76	3.72	−1.061	−8.714	0.01
	Rest Facility Layout (14)	3.50	3.56	−0.062	−0.631	0
	Landscape Space Scale (15)	3.53	3.83	−0.306	−3.584	0

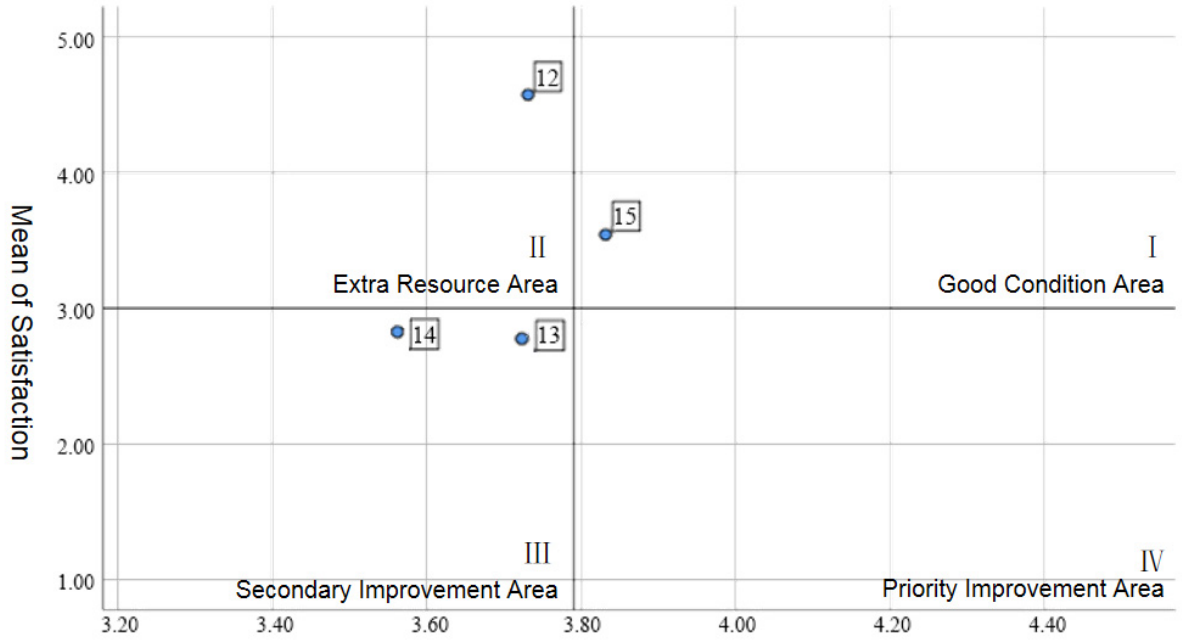

Figure 9. IPA scatter plot for Comfort Criterion Level.



Figure 10. The only sheltered resting area attracts many elderly people (Photo by the Author).

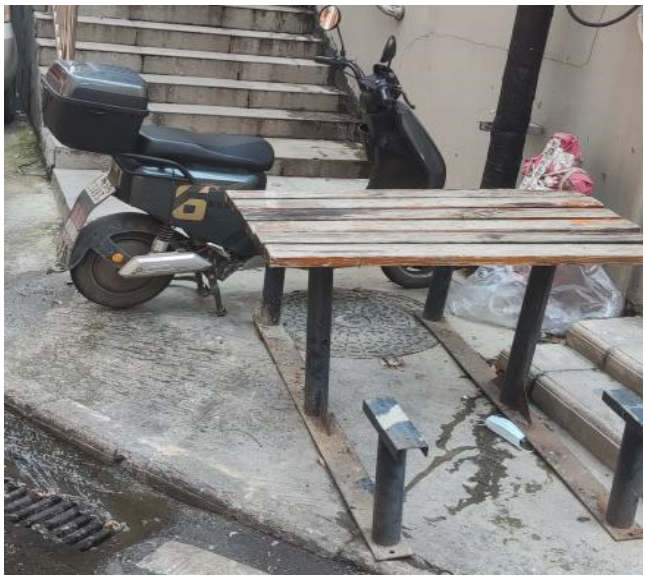

Figure 11. Some of the resting facilities in Shouyi Community are improperly placed and lack maintenance (Photo by the Authors).

4.3.1. Aesthetics Analysis

Analyzing the Paired Samples T-Test Statistics for Aesthetics Indicators (Table 10) and the IPA scatter plot for Aesthetics Criterion Level (Figure 12), in terms of the aesthetics of public spaces, all three factors are in the priority improvement quadrant. Elderly residents believe that plant colors are monotonous and plant varieties are few. Landscape features are sparse and lack maintenance (Figure 13).

Table 10. Paired samples t-test statistics for Aesthetics Indicators.

Criterion Level	Factor	Satisfaction (P) Mean	Importance (I) Mean	Mean Difference (P-I)	t-Value	*p*-Value
Aesthetics (D)	Plant Color Matching (16)	1.67	3.81	−2.139	−14.803	0
	Plant Configuration (17)	2.89	3.81	−0.917	−6.068	0
	Landscape Features (18)	2.47	3.86	−1.389	−10.381	0

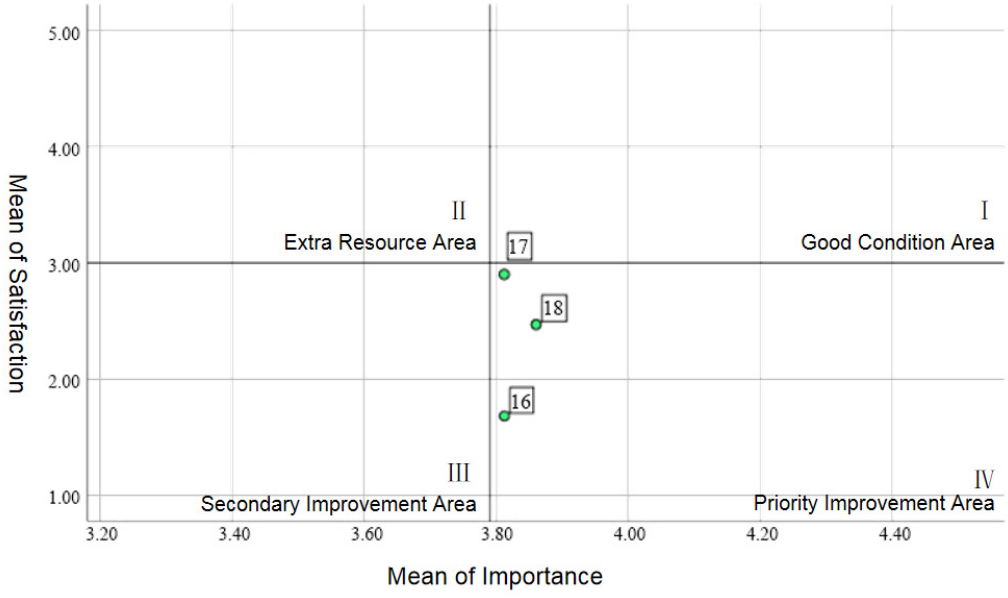

Figure 12. IPA scatter plot for aesthetics criterion level.



Figure 13. The green spaces in Shouyi Community.

5. Conclusions and Suggestions

5.1. Conclusions

IPA is an effective method for resource allocation based on satisfaction and importance evaluation. Analyzing the influencing factors of aging-friendly public spaces using IPA can accurately identify renovation priorities, rapidly enhance residents' satisfaction, and the competitiveness of residential areas. This approach has practical significance in the early assessment process of comprehensive renovation of old residential communities.

5.1.1. Safety in Community Public Spaces Is the Focus of Aging-Friendly Renovations

Due to the decline in physiological functions, the elderly are sensitive to changes in site elevation and spatial brightness in outdoor spaces. This sensitivity is reflected in the need for barrier-free designs in walking and leisure spaces, safety measures for site elevation changes, and adequate night lighting. These are also the main concerns of elderly residents in Shouyi Community, which need to be focused on during the renovation process of old communities.

5.1.2. Parking Difficulties in Old Communities Are a Challenge for Accessibility Renovation of Outdoor Spaces

Among the five accessibility indicators, route organization and spatial continuity, which are in the priority renovation zone, both point to the parking difficulties in old communities. In China, residential areas built before 2000 did not consider the need for motor vehicle parking in their initial planning and design, leading to severe parking space shortages and frequent encroachment of pedestrian spaces by motor vehicles in old communities.

5.1.3. The Importance of Aesthetics in Community Public Spaces Is Gradually Increasing

With the continuous improvement in living standards, people's demand for space aesthetics has also increased on the basis of safety and comfort. There is considerable room for improvement in plant configuration, color matching, and landscape features in old communities.

5.2. Suggestions

5.2.1. Improving Community Public Space Safety

The main content includes the following: zero elevation difference in the site, setting ramps or using terrain transitions in areas with elevation differences for pavilions, corridors,

and other rest facilities in the community activity areas, avoiding single-step elevation differences. At the locations with step elevation differences, wheelchair ramps and warning signs integrated into the environmental landscape should be set, and handrails should be installed according to actual conditions. Secondly, considering the reduced night vision of the elderly, the community's night-lighting facilities should be improved according to the actual situation.

5.2.2. Improving Community Road Traffic

Firstly, fully explore the parking potential. The Shouyi South District tried to solve the community parking problem by converting the sports ground of the middle school on the east side of the community into a combined social parking lot and sports ground, providing a solution for similar residential areas. The Longhu North District can refer to this approach and comprehensively renovate the sports ground of Shouyi Primary School or the vocational school to solve the community parking problem, freeing up some ground space for walking or leisure use. Secondly, optimize the layout of pedestrian roads in the community, improve road quality, and create suitable walking spaces.

5.2.3. Optimizing the Aesthetic and Comfort of the Residential Outdoor Environment

Firstly, it is necessary to enhance the landscape and greening of the residential area, integrating systematic landscape greening with residents' living spaces. Considering the climatic characteristics of hot summers and cold winters, the design of outdoor site pavements should incorporate anti-slip measures, and the design of landscape facilities should consider ventilation and shade from the summer sun to extend the time people spend outdoors. Secondly, optimize the plant configuration in the residential area, using non-toxic, non-fluffy, non-irritating, and harmless plants based on the actual needs of the elderly in the community, while also considering the seasonal and color changes in the plants.

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