



Aging-friendly Renewal in Old Residential Communities: Elderly Residents' Needs, Satisfaction, and Community Governance in Kunming, China

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Abstract

Population ageing and the deterioration of old residential communities have created interconnected environmental and governance challenges for ageing in place in Chinese cities. This study examines the relationship among the physical environment, everyday community management, and elderly residents' needs in Liujiaying Residential Complex, Kunming, China. A mixed-method case-study design was adopted. Field observations were conducted to assess roads, parking, public activity spaces, greenery, accessibility, facilities, sanitation, and maintenance conditions. In-depth interviews were carried out with 10 long-term elderly residents and 10 community or property-management staff, followed by group interviews and a questionnaire survey of residents aged 60 years and above. Of the 328 questionnaires collected, 310 valid responses were retained for analysis. Descriptive statistics, preliminary scale-adequacy checks, thematic coding, non-parametric paired comparisons, SWOT/TOWS synthesis, and a Plan-Do-Check-Act (PDCA) implementation framework were employed. The findings reveal a substantial mismatch between elderly residents' management needs and their satisfaction with existing community conditions, particularly in relation to safety, parking management, environmental maintenance, and management responsiveness. Field observations and interviews further identified blocked fire routes, inadequate pedestrian-vehicle separation, uneven maintenance, insufficient greenery management, and unclear responsibilities among community and property-management actors. The study concludes that ageing-friendly renewal should integrate maintainable physical improvements with clearer responsibility allocation, resident participation, routine monitoring, and adaptive management. The findings provide a governance-oriented approach for improving ageing-friendly renewal in old work-unit residential communities characterized by limited resources and uneven post-renewal management.

Keywords: Aging-friendly Renewal, Old Residential Communities, Elderly Residents, Needs and Satisfaction, Community Governance

Introduction

Population ageing has become a major challenge for community development in China, especially in old urban residential communities built before 2000. China's elderly population has grown rapidly over the past two decades, while many communities developed under the former work-unit system now face ageing facilities, changing ownership structures, and increasing pressure on everyday management (Yang, 2022; Peng & Zhou, 2024; Hu et al., 2021; Zhang & Loukaitou-Sideris, 2026). In Kunming, official statistics show that by the end of 2023 the city had 1.395 million residents aged 60 and above, accounting for 16.07% of the registered population (Kunming Municipal People's Government, 2024). These demographic and institutional changes make the quality and long-term management of neighbourhood environments increasingly important for ageing in place.

Old residential communities present a particular problem because physical decline and management weakness often occur together. Previous studies have reported ageing facilities, weak maintenance, fragmented governance, poor accessibility, disorderly parking, and limited support for social interaction in older communities (Xi et al., 2013; Chen et al., 2021; Wu & Liu, 2018; Xie & Kong, 2024). Physical renovation can improve visible conditions, but the benefits may be short-lived when responsibility for cleaning, repairs, greenery, parking, security, and resident communication remains unclear. The research problem addressed in this article is therefore

not simply how to renovate an old community, but how environmental improvement can be linked with everyday governance so that improvements remain usable and maintainable for elderly residents.

Liujiaying Residential Complex was selected because it provides a clear example of this combined problem. The community is located near Huancheng West Road and Ankang Road in Xishan District, Kunming. It was built in 1997, covers approximately 18,576 m², contains 847 households, and has approximately 1,376 elderly residents. It is divided into East and West districts, both organized around central open spaces. However, the renewal conditions differ: the West District central garden has been partly renovated into a pocket park, whereas the East District largely retains its older spatial structure. The coexistence of renewed and non-renewed areas within one residential complex makes it possible to examine both physical deterioration and problems that remain after partial renovation (As shown in Figure 1).

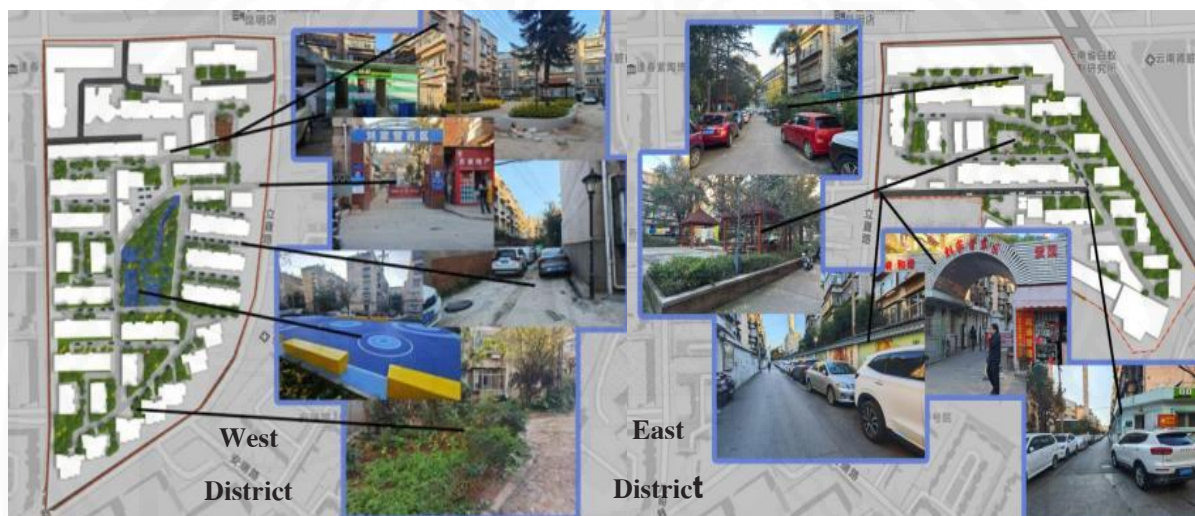


Figure 1 Map of the community.

Based on this problem, the study asks three questions: (1) What environmental and community-management problems currently affect aging-friendly daily life in Liujiaying Residential Complex? (2) What are the main needs of elderly residents, and where are the clearest descriptive gaps between those needs and their satisfaction with current management? (3) How can the combined field, interview, and survey findings be translated into governance-oriented renewal strategies that are feasible under the limited resources of an old residential community? Accordingly, the objectives are to diagnose current environmental and management conditions, assess elderly residents' needs and satisfaction, and develop case-grounded strategies for community governance and continuous improvement.

Literature Review

Aging-friendly community research emphasizes that the ability to age in place is shaped by the interaction between people and their physical and social environments. The World Health Organization (2007) identifies outdoor spaces, transportation, social participation, respect and social inclusion, communication, and community support as interconnected domains of an aging-friendly city. Menec et al. (2011) similarly argue that aging-friendly communities should be understood through both physical and social dimensions. Empirical studies have further shown that walkable environments, usable community facilities, neighbourhood support, and opportunities for participation are associated with older adults' activity, satisfaction, and well-being (Carlson et al., 2012; Roe et al., 2020; Wang et al., 2025; Kim et al., 2022; Webster et al., 2024; Liu & Liao, 2024; Yue et al.,



2025; Tang et al., 2025). These studies suggest that aging-friendly renewal cannot be evaluated only through the presence of facilities; the everyday usability and management of those facilities also matter.

A second body of research concerns community governance and participation. Arnstein (1969) distinguishes meaningful participation from forms of consultation that provide little influence over decisions. Collaborative governance extends this concern by emphasizing sustained interaction, shared responsibility, and joint problem solving among public agencies and non-state stakeholders (Ansell & Gash, 2008; Wang, 2000; Shen, 2013; Zhao, 2023; Liang, 2024; Lin et al., 2024). This perspective is relevant to old Chinese residential communities because responsibility for shared spaces may be distributed among residents' committees, property-management organizations, former work units, residents, and local government. Where responsibilities are fragmented, physical renewal alone may not solve recurring problems of maintenance, parking, security, sanitation, and communication.

Research on aging-friendly renewal in China has increasingly addressed public-space improvement, barrier-free design, and community-based support, but fewer studies connect elderly residents' reported needs and satisfaction directly with the governance arrangements required to maintain renewed spaces over time (Chen et al., 2021; Zhou & Feng, 2023; Xie & Kong, 2024; Zhu, 2023; Greenfield & Pope, 2025). This creates a practical research gap. For old work-unit communities, the question is not only which environmental elements should be improved, but who is responsible for implementation, how residents can provide feedback, and how problems are checked and corrected after renovation. The present study addresses this gap by integrating field diagnosis, interviews, resident survey evidence, case-specific SWOT/TOWS interpretation, and a Plan-Do-Check-Act (PDCA)-based implementation logic within one community-governance analysis.

Research Methodology

Research Design and Case Selection

This study used a sequential mixed-method case-study design. Liujiaying Residential Complex was selected purposively as an old work-unit residential community with a large elderly population, long-term residents, uneven renewal between its East and West districts, and overlapping environmental and management problems. The case is therefore useful for examining both the physical conditions of an old community and the governance capacity required to maintain improvements after renovation.

The study draws on three objectives from the larger dissertation. The first diagnoses current environmental and management conditions; the second examines elderly residents' needs and satisfaction; and the third integrates the findings into governance-oriented strategies. Qualitative evidence was used to explain how problems occur in everyday community life, while quantitative evidence was used to describe the relative intensity of residents' needs and satisfaction. The two forms of evidence were compared during interpretation rather than treated as separate studies.

Data Collection

Field observation focused on the spatial and management conditions most relevant to elderly daily use. Repeated site visits recorded the organization and condition of roads, pedestrian and vehicle movement, parking, entrances, central activity spaces, seating, lighting, sanitation facilities, planting, accessibility facilities, and visible maintenance problems. Conditions in the East and West districts were compared, with particular attention to the partially renovated pocket park in the West District. Photographs, field notes, and spatial records were used to



document recurring problems such as damaged paving, blocked circulation, missing barrier-free connections, poor greenery maintenance, and conflicts between public use and management capacity.

In-depth interviews involved two participant groups ($n = 20$). Ten elderly residents were selected purposively because they were aged 60 years or above, had lived in the community for at least 10 years, were familiar with everyday environmental and management conditions, and were able and willing to describe their experiences. Ten community or property-management staff were selected because their work involved community affairs, property services, sanitation, security, facility maintenance, resident communication, or related management tasks. Individuals without direct residence experience or relevant management responsibilities were excluded. Interview topics covered community security, environmental sanitation, community activities, greenery maintenance, facility repair, parking and road management, responsibility allocation, communication, and constraints on service delivery.

Group interviews with elderly residents were used to explore needs and preferences in greater depth. Discussion covered physiological comfort, safety, social interaction, esteem, and self-development, with specific questions on accessibility, environmental comfort, activity facilities, social spaces, maintenance, communication, and participation. Strategy-focused discussions with elderly representatives and management staff were later used to examine the feasibility of proposed improvements and the constraints affecting implementation.

The questionnaire survey targeted residents aged 60 years and above who lived in Liujiaying Residential Complex and were able to provide informed responses either independently or through an interview-administered format. Residents below 60 years of age, non-residents, and questionnaires with incomplete or invalid responses were excluded. The community had approximately 1,376 elderly residents. Taro Yamane's formula, using a 5% margin of error, was initially applied as a reference for estimating an adequate survey sample size, which yielded approximately 310 respondents. However, because participants were recruited based on eligibility, accessibility, and willingness to participate rather than through strict simple random sampling, the formula was used only as a sample-size reference and not as the basis for claiming probability-based representativeness. A total of 328 questionnaires were collected, of which 18 incomplete or invalid questionnaires were excluded, resulting in 310 valid responses. The questionnaire assessed elderly residents' needs and satisfaction regarding public-space conditions and community management using five-point Likert scales. Management-related items covered environmental sanitation, security, emergency response, facility maintenance, parking and traffic management, communication, service responsiveness, community activities, and resident participation.

Data Analysis

Qualitative material from field observations, interviews, and group discussions was organized through thematic coding. Repeated observations and statements were grouped under environmental and governance themes, including safety and traffic, accessibility, environmental maintenance, security, property-management capacity, communication, and participation. The SWOT categories were not directly defined by participants. Instead, the researcher reviewed and compared the coded evidence and classified recurring internal positive conditions as strengths, internal constraints as weaknesses, external enabling conditions as opportunities, and external risks as threats. The TOWS matrix was then used to combine these case-specific conditions into strategy directions.

Questionnaire data were entered into Excel and SPSS and screened for incomplete responses and coding errors. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize demographic characteristics, needs, and satisfaction. KMO and Bartlett's tests were used as preliminary checks of sampling adequacy and factorability for the four questionnaire scales; they were not used to test differences between needs

and satisfaction. KMO values were 0.810 for public-space needs, 0.792 for management needs, 0.744 for public-space satisfaction, and 0.732 for management satisfaction, with all Bartlett's tests significant at $p < .001$. To determine whether the observed need-satisfaction gaps were statistically significant, paired comparisons were conducted for the same 310 respondents. Normality was assessed on the paired difference scores using the Shapiro-Wilk test. All five difference distributions departed significantly from normality (all $p < .001$); the Wilcoxon signed-rank test was therefore used in place of a paired-samples t -test. Effect size was calculated as $r = |Z|/\sqrt{N}$.

Prompts

Type 2: Language Refinement

To ensure linguistic precision, the manuscript drafts were refined using ChatGPT-5.4 Thinking. The refinement process used prompts such as: 'Proofread the following text for academic tone and clarity while maintaining the original technical meaning.' Each modification was reviewed and approved by the authors.

Results

Current Problems of Community Environment and Management

Field observation showed that the community's physical problems were unevenly distributed rather than uniform. The West District had benefited from partial pocket-park renovation, including improved paving and facilities, while the East District largely retained its older spatial condition. Nevertheless, the renovated area still experienced management-related problems, including outside users, noise, uneven maintenance, and conflicts between open public use and residential expectations. Across both districts, damaged road surfaces, mixed pedestrian-vehicle movement, disorderly parking, weak accessibility continuity, insufficient resting support, and inconsistent greenery maintenance reduced the everyday usability of public space for older residents. As summarized in Table 1, these observations were interpreted together with interview evidence rather than as stand-alone visual judgments.

The interviews confirmed several of the observed problems and also explained why they persisted. One long-term resident described the greenery as abundant but poorly maintained, noting that weeds were often left uncleared. A community worker reported that, after complaints about untrimmed green space, five resident volunteers had to be organized to assist with weeding and pruning because property-management staff cited insufficient manpower and equipment. Residents also reported untimely waste removal and poor sanitation in shared areas. These accounts support the field observation that maintenance problems were not caused only by physical ageing, but also by limited routine service capacity.

Management arrangements also differed between the two districts. The dissertation fieldwork found that the West District relied mainly on unit self-management and government support for basic cleaning and security, while the East District had a property-management company but charged only about RMB 300 per household per year. Staff interviews indicated that this low fee level limited personnel and maintenance capacity. Residents and staff further described a cycle in which weak services reduced willingness to pay, while low fee collection restricted the ability of the property organization to improve services. Responsibility for repairs, greenery, and shared facilities could also require coordination among the residents' committee, property organization, and property-rights unit, which sometimes delayed action. These findings provide the governance explanation for the environmental problems listed in Table 1.



Interview responses were not uniform on every issue. Greenery provides one example. Some long-term residents were dissatisfied with weeds and insufficient pruning, whereas others were more concerned about mature trees blocking daylight. One resident also expressed disappointment that bamboo had been removed during the previous renovation. These differences show that maintenance and renewal decisions cannot assume that residents share a single view of what constitutes an improved green environment.

Table 1 Summary of major environmental and management problems identified in Liujiaying Residential Complex

Problem Dimension	Main Manifestation	Management Implication
Safety and traffic	Damaged pavements, poor pedestrian–vehicle separation, disorderly parking, blocked fire routes	Routine inspection and circulation control need to be strengthened
Accessibility	Missing ramps, handrails, and continuous barrier-free routes	Accessibility must be treated as a basic service responsibility rather than a one-time project item
Environmental maintenance	Weeds, dead plants, weak pruning, low-frequency cleaning, damaged facilities	Daily maintenance routines and clearer task allocation are required
Community order and participation	Frequent entry of outsiders, weak communication, limited activities, low resident participation	Collaborative governance and resident–engagement mechanisms need to be improved

Profile, Needs, and Satisfaction of Elderly Residents

The survey sample consisted of 310 valid responses. Survey records showed a mean age of 73.55 years and a mean residence duration of 21.85 years. As shown in Table 2, 68.4% of respondents were women, 77.1% were functionally independent, and 63.9% reported using community public spaces several times a day.

The long residence duration and frequent public-space use indicate that respondents had substantial first-hand experience of everyday environmental and management conditions.

Table 2 Demographic characteristics of the survey respondents (n = 310)

Demographic Characteristics		Number of People	Percentage
Gender	Male	98	31.6
	Female	212	68.4
	Total Population	310	100.0
Family structure	Living alone	56	18.1
	Only the couple	105	33.9
	Living with children	128	41.3
	Living with other people	21	6.8
	Total Population	310	100.0
Current physical condition	Complete self-help	239	77.1
	Semi-autonomous	64	20.6
	Completely dependent on care	7	2.3
	Total Population	310	100.0
Educational status	High school and below	275	88.7
	junior college	35	11.3
	Total Population	310	100.0
Monthly income	2000 yuan or less	92	29.7
	2001–4000 RMB	92	29.7
	4,001–6,000 RMB	91	29.4
	6,001–8,000 RMB	35	11.2
	Total Population	310	100.0

**Table 2** (Cont.)

Demographic Characteristics		Number of People	Percentage
The main components of your social network in the community are	kinsfolk	35	11.3
	friend	77	24.8
	neighbour	184	59.4
	Community workers	14	4.5
	Total Population	310	100.0
How often do you use community public spaces such as gardens and squares?	Several times a day	198	63.9
	Once a day	49	15.8
	2–3 times per week	42	13.5
	once a week	7	2.3
	2–3 times per month	14	4.5
	Total Population	310	100.0

Table 3 shows that elderly residents placed the highest management priority on basic environmental and safety conditions. Keeping public areas clean and tidy received a mean of 4.27, followed by a reliable security system (4.18) and effective emergency measures (4.14). Social communication and fair complaint handling were also rated highly (both 3.68). At the dimension level, safety needs were highest (3.90), followed by social and esteem needs (both 3.58). These results are consistent with the interviews, in which residents repeatedly raised sanitation, security, blocked routes, maintenance, and communication as everyday concerns.

Table 3 Management-related needs of elderly residents

Need Dimension / Item	Mean	S.D.	Level
Public areas kept clean and tidy	4.27	0.810	Extremely high
Reliable security system	4.18	0.777	High
Effective emergency measures	4.14	0.760	High
Spaces and activities for communication	3.68	0.820	High
Fair and prompt complaint handling	3.68	0.924	High
Management needs assessment (overall)	3.39	0.524	Medium
Physiological needs (dimension)	3.29	0.525	Medium
Safety needs (dimension)	3.90	0.717	High
Social needs (dimension)	3.58	0.766	High
Esteem needs (dimension)	3.58	0.874	High
Self-actualization needs (dimension)	2.61	0.639	Medium

As shown in Table 4, satisfaction with current community management remained moderate to low. Parking management received the lowest score (2.02), followed by management of vehicles and pedestrian flow (2.05). Communication on important matters (2.50) and staff responsiveness (2.55) were also low. At the dimension level, transportation and facilities scored 2.48, property management 2.56, and environment and safety 2.57. The interview evidence helps explain these ratings: residents described blocked circulation, delayed maintenance, weak control of outside users, and unclear channels for resolving recurring problems.

**Table 4** Satisfaction with current community management

Satisfaction Item / Dimension	Mean	S.D.	Level
Parking management ensures safe and smooth passage	2.02	0.967	Low
Effective management of vehicles and pedestrian flow	2.05	0.854	Low
Property management communicates effectively and promptly	2.50	0.988	Low
Property staff respond promptly when assistance is needed	2.55	0.915	Low
Management fee usage is transparent	2.64	0.880	Moderate
Overall atmosphere gives a sense of belonging	3.11	0.610	Moderate
Environment and safety (dimension)	2.57	0.928	Low
Property management (dimension)	2.56	0.800	Low
Transportation and facilities (dimension)	2.48	0.639	Low
Community culture and activities (dimension)	2.98	0.594	Moderate
Management satisfaction assessment (overall)	2.65	0.580	Moderate

The mean differences in Table 5 were examined at the respondent level rather than treated as descriptive gaps alone. Shapiro–Wilk tests showed that none of the five paired difference distributions met the normality assumption (all $p < .001$), so Wilcoxon signed–rank tests were used. The clearest mismatch concerned safety: the mean need score was 3.90, compared with 2.57 for environment–and–safety satisfaction (mean gap = 1.33; $Z = -12.619$, $p < .001$, $r = .717$). Esteem needs were also markedly higher than satisfaction with property management (3.58 vs. 2.56; gap = 1.02; $Z = -10.747$, $p < .001$, $r = .610$). Smaller, but still substantial, differences were found for physiological needs versus environment–and–safety satisfaction (3.29 vs. 2.57; $Z = -9.553$, $p < .001$, $r = .543$) and for social needs versus satisfaction with community culture and activities (3.58 vs. 2.98; $Z = -9.748$, $p < .001$, $r = .554$). In each of these four comparisons, need exceeded satisfaction. Self–actualization showed the opposite pattern: its mean need score was 2.61, whereas satisfaction with volunteer–service support was 3.02 ($Z = -7.456$, $p < .001$, $r = .423$). Taken together, the tests sharpen the descriptive picture rather than simply repeating it. The largest shortfalls lie in basic safety, everyday environmental conditions, and management response, while volunteer–related support does not show the same deficit.

Table 5 Wilcoxon signed–rank tests of need–satisfaction differences ($n = 310$)

Need–Satisfaction Comparison	Need M	Satisfaction M	Mean Gap	Wilcoxon Z	p
Safety needs vs. environment and safety satisfaction	3.90	2.57	1.33	-12.619	< .001
Physiological needs vs. environment and safety satisfaction	3.29	2.57	0.72	-9.553	< .001
Esteem needs vs. property–management satisfaction	3.58	2.56	1.02	-10.747	< .001
Social needs vs. community culture and activities satisfaction	3.58	2.98	0.60	-9.748	< .001
Self–actualization needs vs. volunteer–service satisfaction	2.61	3.02	-0.41	-7.456	< .001

Management Strategy and Implementation Logic

The SWOT analysis was grounded in evidence from field observations, interviews, and the resident survey. Strengths included established community organizations, central open spaces, and strong long–term resident attachment, whereas major weaknesses concerned uneven renewal, limited property–management capacity, parking disorder, incomplete accessibility, and weak maintenance. Opportunities arose from policy support for old–community renewal, the availability of multiple potential governance actors, and incremental renewal mechanisms. Major threats included limited financial resources, unclear responsibility boundaries, increasingly diverse elderly needs, and the risk of renewed deterioration where follow–up maintenance is insufficient.

External Opportunities (O)	SO Strategies • Use existing open spaces for small-scale ageing-friendly activities • Strengthen resident participation and community networks • Promote multi-actor collaborative renewal	WO Strategies • Use policy support to improve maintenance and accessibility • Strengthen coordination among community, property management, and residents • Improve parking, communication, and service responsiveness
	ST Strategies • Strengthen access control and fire-route management • Establish routine safety inspection and resident reporting • Prioritize low-cost and maintainable improvements	WT Strategies • Avoid large-scale, high-maintenance interventions • Clarify management responsibilities • Establish continuous monitoring and adjustment
External Threats (T)	Internal Strengths (S)	Internal Weaknesses (W)

Figure 2 TOWS matrix for adaptive aging landscape and community management strategies based on SWOT.

As shown in Figure 2, the TOWS matrix combines internal strengths and weaknesses with external opportunities and threats to generate four strategic pathways: SO, WO, ST, and WT. The matrix provides the analytical link between the case-specific SWOT findings and the operational strategies summarized in Table 6.

SO strategies build on existing spatial and social strengths to support small-scale ageing-friendly activities and resident participation. WO strategies use policy support and multi-actor coordination to address weaknesses in maintenance, accessibility, parking, and communication. ST strategies strengthen safety and community order through access control, fire-route management, routine inspection, and resident reporting. WT strategies emphasize phased, modular, and maintainable interventions under financial and institutional constraints.

Table 6 Case-specific strategy directions derived from the TOWS analysis for Liujiaying Residential Complex

TOWS Type	Case-Specific Strategic Basis	Operational Direction
SO	Existing central open spaces and strong resident attachment	Develop dispersed resting/social nodes, inter-generational activities, and resident-supported programming
WO	Policy support and multi-actor coordination can compensate for weaknesses in maintenance, accessibility, and service delivery.	Prioritize low-cost repairs, continuous barrier-free routes, parking order, clearer maintenance tasks, and simpler feedback channels
ST	Existing community organizations provide an institutional basis for maintaining safety under increasing public use.	Strengthen access management, fire-route inspection, night lighting checks, and rapid reporting of hazards
WT	Limited financial resources and unclear responsibility boundaries constrain large-scale or maintenance-intensive interventions.	Avoid large high-maintenance projects; use phased, modular interventions and assign maintenance responsibility before implementation

Table 7 summarizes recommended responsibilities and actions for stakeholder groups relevant to future implementation.

**Table 7** Stakeholder-oriented recommendations for community management optimization

Stakeholder	Primary Focus	Recommended Actions
Landscape designers	Manageable environmental upgrading	Prioritize walking continuity, lighting, resting nodes, barrier-free access, and low-maintenance planting
Community managers	Coordination and participation	Establish consultation mechanisms, routine issue tracking, and proactive monitoring of high-risk problems
Property management companies	Routine service delivery	Improve cleaning, repairs, lighting inspection, parking order, and elderly-focused maintenance routines
Government agencies	Institutional support	Clarify accountability, fund maintenance as well as construction, and support participatory governance mechanisms
Residents and homeowners	Community co-governance	Participate in consultation, protect shared spaces, and support rules for parking, access, and collective maintenance
Social organizations and volunteer groups	Complementary social support	Organize elderly activities, companionship, participatory planning support, and inter-generational programs

Discussion

The findings show that aging-friendly renewal in Liujiaying is a socio-spatial governance problem rather than a purely physical design problem. The field evidence demonstrates that damaged paving, weak pedestrian-vehicle separation, incomplete accessibility, and uneven maintenance directly affect daily use, while the interviews show that these conditions are reinforced by low service capacity and unclear responsibility boundaries. This interpretation is consistent with research on old-community renewal in China, where physical decline and governance difficulties frequently coexist (Chen et al., 2021; Xie & Kong, 2024; Zhu, 2023; Greenfield & Pope, 2025). The comparison between the partially renovated West District and the less-renovated East District further shows that construction itself does not guarantee sustainable improvement; follow-up management remains necessary after physical upgrading.

The needs and satisfaction results add a resident-centred explanation to this governance problem. Older residents gave high priority to cleanliness, security, emergency response, communication, and complaint handling, while satisfaction was especially low for parking, traffic management, communication, and staff responsiveness. This pattern is compatible with aging-friendly community research, which treats safety, participation, communication, and community support as interconnected conditions rather than isolated services (World Health Organization, 2007; Menec et al., 2011; Kim et al., 2022; Webster et al., 2024; Tang et al., 2025; Liu & Liao, 2024; Yue et al., 2025; Liang, 2024; Lin et al., 2024). It also reflects Maslow's (1943) argument that basic safety and belonging needs shape higher-level participation and esteem. In practical terms, residents are unlikely to experience a community as aging-friendly when basic circulation, cleanliness, safety, and response mechanisms remain unreliable.

From a management perspective, the study supports collaborative governance but also shows the limits of collaboration when roles and resources are unclear. Ansell and Gash (2008) emphasize sustained interaction, trust building, shared understanding, and joint responsibility among stakeholders, while Wang (2000), Shen (2013), and Zhao (2023) highlight the institutional and participatory dimensions of urban community governance. In Liujiaying, the residents' committee, property-management arrangements, former work-unit/property-rights actors, residents, and government agencies all influence community conditions, but their responsibilities do not always align. The low property-fee context further limits what the property organization

can deliver. Collaborative governance in this setting should therefore begin with practical responsibility allocation: who inspects fire routes, who handles greenery, who responds to facility damage, who communicates with residents, and which issues require government or property-rights-unit intervention.

The PDCA framework is proposed as an implementation logic for these responsibilities. In the Plan stage, priorities should be selected from field risks and resident needs; in Do, responsible actors implement small-scale and feasible actions; in Check, residents' feedback, inspection records, and repeated satisfaction measures are used to review performance; and in Act, ineffective measures are adjusted and unresolved problems enter the next cycle. The framework has not yet been empirically tested through a completed intervention cycle in Liujiaying. It should therefore be understood as a proposed governance mechanism derived from the study findings, not as a validated causal model. This distinction addresses the implementation gap while avoiding claims beyond the available evidence.

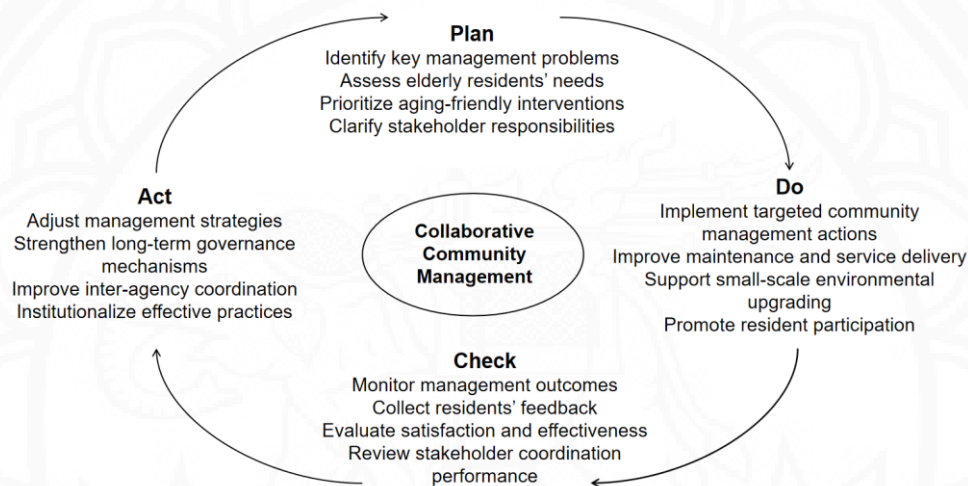


Figure 3 PDCA-based collaborative community management model for aging-friendly renewal.

This figure presents the proposed management model of the study. It emphasizes that aging-friendly renewal in old residential communities should not rely on one-time intervention, but should be promoted through a continuous cycle of planning, implementation, evaluation, and adjustment.

Limitation and Future Research

This study has several limitations. First, it is based on one old work-unit residential complex in Kunming. The findings are closely related to Liujiaying's demographic structure, East-West renewal differences, property-management arrangements, and local institutional context, and should not be mechanically generalized to communities with different socio-economic or governance conditions. Second, although the respondent-level Wilcoxon tests confirm significant differences between conceptually corresponding need and satisfaction dimensions, those dimensions were not constructed as exact item-for-item mirror scales. The comparisons should therefore be read as evidence of systematic mismatches between related domains, not as tests of identical constructs. The use of a non-probability participant recruitment approach may limit the statistical generalizability of the survey findings beyond the sampled elderly residents and the case community. Future surveys could use directly matched need and satisfaction items to allow more precise pairwise interpretation. Third, the PDCA model was developed at the strategy-formulation stage and has not yet been tested longitudinally after implementation.



Future research should therefore compare several types of old residential communities, including communities with different construction periods, resident compositions, management models, and levels of previous renovation. Longitudinal post-occupancy evaluation could examine whether improvements to safety, accessibility, maintenance, communication, and participation lead to measurable changes in satisfaction and everyday use. Future work should also follow a complete PDCA cycle to test whether the proposed responsibility and feedback mechanisms improve implementation and maintenance performance over time.

Conclusion

This study examined aging-friendly renewal in Liujiaying Residential Complex by connecting environmental conditions, elderly residents' needs and satisfaction, and community governance. The evidence shows that the most persistent problems are not limited to deteriorated facilities. They also include disorderly parking, incomplete accessibility, weak maintenance, low property-management capacity, unclear responsibility boundaries, and limited communication and participation. Survey results reinforce these observations: safety needs were high (3.90), while satisfaction with environment and safety was low (2.57), and parking management received the lowest individual satisfaction score (2.02).

The main contribution of the study is to show how aging-friendly renewal can move from a one-time construction logic toward a continuous governance process. For Liujiaying, priority should be given to maintainable improvements in walking, lighting, resting, accessibility, greenery, parking order, and shared-space safety, together with clearer responsibilities among community managers, property-management actors, residents, government agencies, and supporting social organizations. The proposed SWOT/TOWS and PDCA framework provide a case-grounded way to connect diagnosis, action, monitoring, and adjustment, while its effectiveness still requires future longitudinal validation.

Recommendations for Landscape Designers

Landscape designers should focus on manageable environmental improvements that directly affect elderly residents' daily use, including walking continuity, lighting, seating, shading, accessibility, and low-maintenance planting.

Recommendations for Community Managers

Community managers should strengthen consultation mechanisms, proactive monitoring, and issue-tracking routines so that environmental problems and resident concerns can be addressed more continuously and transparently.

Recommendations for Property-Management Companies

Property-management companies should improve baseline service quality through regular cleaning, lighting inspection, small-scale repairs, parking control, and maintenance routines oriented to the needs of elderly residents.

Recommendations for Government Agencies

Government agencies should provide long-term institutional and policy support, including clearer accountability, funding for maintenance as well as construction, and support for participatory community governance.

Recommendations for Residents and Homeowners

Residents and homeowners should be encouraged to participate more actively in consultation, community co-governance, and the protection of shared spaces and circulation routes.



Recommendations for Social Organizations and Volunteer Groups

Social organizations, universities, and volunteer groups can supplement formal services by supporting elderly activities, health education, inter-generational exchange, and participatory planning.

Ethics Statement

All research procedures involving human participants were conducted in accordance with standard ethical principles for social research. Participation in the questionnaire survey and interviews was voluntary, informed consent was obtained from all participants, and all responses were anonymized prior to analysis. No personally identifiable information is reported in this manuscript.

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Conflict of Interests

All authors have no conflicts of interest.

Author Contributions

Leqi Yang: Writing – Original draft. Creating the first and full version of an article, drafting substantial original text within a section or across sections in an article.

Bongkochmas Ek-Iem: Writing– Review and editing. Reviewing, copy-editing, refining language and providing comments and suggestions. Conceptualization– Refining and adapting overarching research goals and aims. Supervision– Guiding teams in refining methods, interpreting results, and addressing interpersonal challenges.

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Declaration of Generative AI and AI-assisted Technologies

During the preparation of this work, the authors used ChatGPT-5.4 Thinking to improve language, grammar and readability. Specifically, the methodology section describes the prompts used for language refinement. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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