

SPATIAL STRATEGIES AND IMPLEMENTATION PATHWAYS FOR THE ALL-AGE FRIENDLY RENEWAL OF OLD COMMUNITIES IN ZHUHAI UNDER THE ORIENTATION OF MODERN MARINE CITIES

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Abstract: Coastal cities have shifted from outward expansion to reworking the housing stock they already hold, and renewing aging communities has become harder to manage as a result. Three pressures overlap in these neighborhoods: a resident profile that no longer matches the original design brief, almost no slack in the public space budget, and marine-climate risks that accumulate rather than arrive one at a time. Strategy proposals are abundant in the literature; empirical grounding for them is thinner. This study therefore works through two Zhuhai cases, HuaFa Community and Jiangjunshan Community, and deliberately avoids generating fresh questionnaire data. The evidence used is material a reader can check: HuaFa's community health inspection records, the 3,000-plus items of resident feedback reported in the Ministry of Housing and Urban-Rural Development case collection, the Jiangjunshan contiguous redevelopment documents, and the "Community Service Center" program. Policy analysis, literature review, evidence coding, activity-chain analysis and case comparison are combined into a six-step chain of reasoning: factual evidence, problem type, affected activity chain, spatial mechanism, strategic response, evaluation indicator. The same chain translates "modern maritime city" into five community qualities that can be observed on site: spatial openness, blue-green permeability, slow-mobility continuity, functional complexity and climate adaptability. Six strategies follow from it. These are networked restructuring of public space, integration of an all-age slow-mobility system, embedding of composite service units, continuous accessibility across the whole journey, blue-green micro-system integration, and intergenerational sharing supported by operational governance. They are then arranged as a loop running from identification through classification, renewal and operation to evaluation. The argument, in short, is that traceable evidence should decide which problems get addressed and which strategies get chosen. Renewal on that basis is no longer a checklist of works but governance of living space organized around how residents actually move through their day.

Keywords: Modern maritime cities; Aging community renewal; All-age-friendly design; Secondary survey; Evidence chain

1 INTRODUCTION

Work on aging urban residential communities no longer resembles building repair. Patching roofs, replacing pipes and resurfacing lanes were once the whole of it; the brief now extends to infrastructure, public services, governance and the question of who keeps everything running afterwards. The State Council's Guiding Opinions on Comprehensively Promoting the Renovation of Aging Urban Residential Communities sets out that balance explicitly, asking that residents' wishes, facility upgrading and durable management mechanisms be weighed together [1]. The parallel push for "complete communities" goes further, folding elderly care, childcare, fitness, convenience retail, accessibility and governance into units a resident can walk across [2].

Zhuhai makes an unusually demanding test case. The city sits between mountains and sea, is hot, humid and wet for much of the year, takes typhoons regularly, and has a population structure open enough that the resident mix changes faster than the building stock. Its older communities carry the familiar deficits (too few parking spaces, worn-out facilities, public space broken into leftovers) along with a second set that is specifically coastal. Infrastructure here must shade people, carry heavy rainfall, survive wind and salt, and come back into service quickly after a storm. Read "modern maritime city" narrowly, as coastal scenery or a decorative vocabulary, and the macro vision never reaches the spaces residents use every day. "All-age friendliness" fails in the mirror-image way. Reduced to a checklist with one line each for children, older adults and working-age residents, it subdivides space that was already too scarce.

Age-friendly, child-friendly, intergenerational and universal design all rest on a mature body of work [3-12]. Two gaps nevertheless persist when that work is applied to aging communities. The first is a missing audit trail between diagnosis and design: a general problem is noted, a strategy is prescribed, and the steps in between go unrecorded. The second concerns what happens after construction, where evaluation tends to stop at counting facilities or noting that the place looks better. Neither tells us whether the intervention held up. There is a related problem with illustration. If tables and diagrams in a planning paper only decorate the argument rather than organize data, consolidate evidence or carry a

transformation of logic, the text cannot explain why these problems were selected, why those strategies were preferred, or on what basis either was tested.

This study responds by shifting effort away from producing additional strategies and toward completing the chain of evidence. The method is a secondary survey built on public data. Where original questionnaires, behavioral observation or microclimate measurement were not available to us, we did not invent them. We coded, in a structured way, material that is already on the record: official health assessment results, aggregated resident feedback, engineering particulars, governance documents and published case files. The sequence runs from macro orientation and secondary survey through evidence compilation, problem classification, activity-chain mechanism, strategic response and case validation to dynamic evaluation. Every step in Figure 1 has a table, diagram or comparison attached to it in the body of the paper, which is what makes the reasoning auditable.

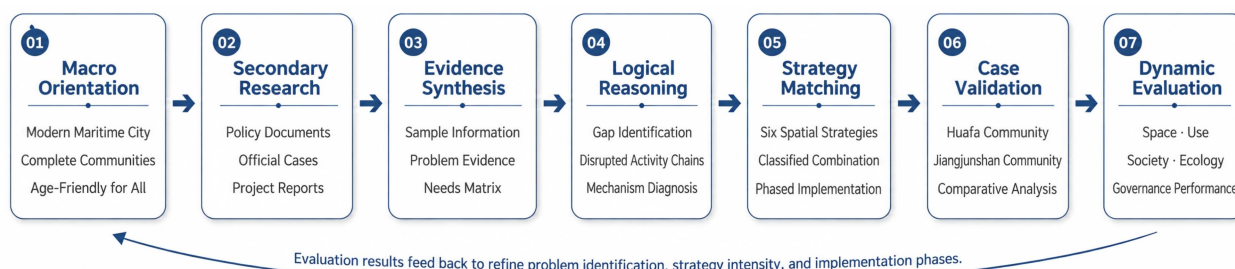


Figure 1 Research Technical Approach and Evidence Chain Closed-Loop Diagram

Source: drawn by the authors from the research design.

Figure 1 functions less as a process diagram than as an index to the evidence. Each later section is anchored to specific material: Tables 3 and 4 with Figure 2 for the secondary survey compilation; Table 5 and Figure 3 for problem classification and activity-chain mechanism; Figure 4 and Table 6 for the strategic response; Table 7, Figure 5 and Table 8 for case comparison and dynamic assessment. Any strategy named in the paper can be traced back to a piece of evidence and forward to an implementation and evaluation indicator. That arrangement is what keeps the interventions and the survey material from drifting apart.

2 RESEARCH DESIGN, CONCEPTUAL TRANSLATION AND EVIDENCE SOURCES

2.1 What Each Core Concept Is Being Asked to Do

The concepts used here operate at different levels, and the paper separates them before using them: macro policy, community planning, spatial design. A modern maritime city states a direction of urban development. The “complete community” supplies an organizational frame covering both services and living space. Age-friendly and child-friendly approaches concern equitable rights and environmental access for particular groups. Universal design asks that people of differing abilities share the same space rather than separate provisions. Collaborative co-creation addresses resident participation and the governance that must continue afterwards. Keeping these roles distinct matters, because a policy slogan borrowed as a design conclusion explains nothing.

Table 1 Core Concepts, Theoretical Foundations, and the Purpose of This Analysis

Core Concept	Theoretical/Policy Sources	Core Focus	Analysis purpose in this article
Modern maritime city	Zhuhai Urban Development Strategy and Coastal City Studies	Openness, Ecology, Resilience, Land–Sea Relations	Translated into observable community space performance – not as a decorative style label.
Complete Community	Ministry of Housing and Urban-Rural Development and Ministry of Civil Affairs – Requirements for Comprehensive Community Development [2]	15-minute living circle, basic services, co-construction, and co-governance	Determine whether service facilities are accessible, comprehensive, and continuously open.
Age-friendly	WHO Age-Friendly Cities Framework [3-5]	Outdoor spaces, transportation, housing, participation, and services	Identify continuous walking, resting, accessibility, and care-related needs within the elderly activity chain.
Child-friendly	Child-Friendly Cities and Participatory Planning Research [10, 12]	Safe play, natural interaction, independent travel, participation	Identifying the needs related to school commute, activities downstairs, care visibility, and natural experiences
Universal Design/Accessibility	Accessibility Environment Construction Act; Residential Area Standards [13-14]	Suitable for users of all ages and abilities	Expand a single-point ramp into a comprehensive residential–road–facility accessibility chain.

Core Concept	Theoretical/Policy Sources	Core Focus	Analysis purpose in this article
Joint Creation	Participatory Renewal Practice in Zhuhai's Older Residential Communities [15]	Joint planning, joint construction, joint management, and joint evaluation	Extending resident feedback collection from the initial proposal consultation phase to operational rules and annual reassessment processes

One change in Table 1 is worth pointing out. The column that would normally read “conceptual reference” has been replaced by a question: which analytical task does this concept impose? Age-friendliness, on that reading, does not translate into “add seating”. It requires following the actual trajectory of an older resident from home to the market, the clinic and the bus stop, then responding to what is found along it. The interval at which a rest becomes necessary. The point at which a ramp stops. The surface that turns slippery after rain. Theory is being used here to read evidence, not to supply a rationale after the fact.

2.2 Translating the Modern Maritime City to Community Scale

Discussions of modern coastal cities normally cover the marine economy, technological innovation, ecological conservation, cultural openness and land-sea integration. Renewing an aging community requires something narrower. Those principles have to become outcomes a resident notices, a planner can diagnose and an engineer can build within budget. The translation proposed here uses five dimensions: spatial openness, blue-green permeability, slow-mobility continuity, functional complexity and climate adaptability. They are used three times over, in diagnosis of current conditions, in strategy selection and in evaluation of outcomes, which keeps the analysis and the implementation on the same terms.

Table 2 Community-Scale Translation Table Based on Modern Marine City Principles

Community-scale dimension	Macro-Value Translation	Space requirement	Observable/evaluable indicators
Spatial openness	Shifting from urban openness to community sharing	The boundary is traversable; the ground-level interface is open; public nodes are connected to the streets.	Entrance and exit layouts, perimeter wall discontinuities, walkability of public spaces, shared usage periods
Blue-Green Permeability	The transition from marine ecology to everyday ecological processes	Canopies, permeable surfaces, rain gardens, and sunken green spaces are incorporated into the high-frequency pathway.	Continuous shading, continuous water-exposed surfaces, water accumulation points, and maintenance of stormwater facilities
Slow Motion Continuity	The shift from open transportation systems to continuous residential travel patterns	Walking, cycling, accessibility services, and public transport connections form a comprehensive network.	Human walking discontinuities, continuous ramps, lighting shadow zones, and spacing between rest stops
Functional complexity	Shifting from resource aggregation to the efficient utilization of existing resources	Multi-purpose spaces, staggered sharing, service integration, and revitalization of underutilized spaces	Available duration, number of reuse functions, service radius, idle rate/reserved usage
Climate adaptability	Shifting from coastal resilience to micro-space performance	Shading and ventilation; drainage; wind and salt tolerance; rapid post-disaster recovery	High-temperature exposure conditions, water accumulation risk, material durability, post-typhoon recovery records

Source: compiled by the authors from the environmental characteristics of Zhuhai's coastal area together with sponge city and community renewal requirements.

Table 2 addresses an objection that comes up early: what, exactly, does a coastal city have to do with an aging residential block? Coastal character does not come from applying ship's-wheel or shell motifs to facades. Heat, humidity, frequent rain and typhoons are the local conditions, and they are better treated as a design brief for shade, drainage and weather resilience. Openness works the same way. Removing a perimeter wall does not produce it. It comes from accessibility, shared use and connection to public services, within boundaries that remain safe and that somebody is responsible for managing.

2.3 Sample Selection and Secondary Survey Data

Two communities were selected: Huafa Community in Xiangzhou District and Jiangjunshan Community in Gongbei Subdistrict. They are not a sample from which to estimate conditions across Zhuhai. They are a test of differentiation. Huafa has a comparatively sound base of public services and a pilot designation, so it is useful for watching how a demand assessment turns into facilities and spatial works that close identified gaps. Jiangjunshan is a cluster of older residential compounds, all predating 2000, with no effective property management across much of it and complicated ownership boundaries. It suits a different question: whether contiguous redevelopment and unified operation can handle problems that cross compound lines.

The data fall into three groups. First, the community health check, questionnaire material and construction figures for Huafa recorded in the Ministry of Housing and Urban-Rural Development's Collection of Complete Community

Development Case Studies (Third Batch) [16]. Second, baseline conditions, the demonstration unit and the contiguous redevelopment program for Jiangjunshan, as reported in local public project documents [17-18]. Third, material on the “Joint Creation” participatory renewal work in Zhuhai’s older communities assembled by a Sun Yat-sen University team, used here to check the demand survey, the interviews and the joint planning mechanism [15]. Response frequencies for individual questionnaire items, age structures at the individual level, behavioral trajectories and microclimate readings are not in the public record. We have not reconstructed rates or run significance tests on them. What we do instead is describe traceable facts through coding, and compare the mechanisms behind them.

Table 3 Basic Information and Available Evidence Table for the Survey Sample

Project	Huafa Community	Jiangjunshan Community	Evidence Purpose
Location/Type	Nanping Town, Xiangzhou District; Comprehensive Community Pilot Program	Gongbei Subdistrict, Xiangzhou District; Cluster-based Renovation Project for Aging Residential Communities	Establishing a differentiated case study foundation
Community size	200 hectares; over 11,000 households; over 18,000 permanent residents [16]	Approximately 33.2 hectares; 28 residential communities [18]	Identify differences in spatial scale and governance scope
Population/Demand Characteristics	Over 450 foreign residents and nearly 2,000 residents from Hong Kong and Macau; focusing on the elderly and young children [16]	All 28 residential complexes were built before the year 2000; 18 of them do not have property management services [18].	Explain the distinct pressures associated with service composition and governance synergy.
Demand-side data	Community health check-ups combined with questionnaires yielded over 3,000 pieces of feedback and suggestions [16].	Online questionnaires, offline interviews, and resident consultation mechanisms in the collaborative co-creation process [15]	The source of the support issue and the logic of citizen participation
Typical quantitative shortcoming	Nearly 200 residential buildings lack dedicated access routes for persons with disabilities [16].	Non-property-managed residential complexes: 18/28 = 64.3% [18]	Generate verifiable core issue evidence
Construction/Governance Data	Four additional micro-bus stops have been added; 500 new parking spaces and 100 charging stations have been installed [16].	Jiangjunshan Residential Complex – Demonstration Unit 312 (23 residential buildings + 2 public buildings) approx. 31,300 m ² [17]	Verify whether the testing strategy has been genuinely implemented in engineering or operations.

Source: compiled by the authors from [16] and [15, 17-18]. The 64.3% figure is a descriptive conversion of 18/28.



Note: This evidence overview presents structured facts from publicly available sources; it is not a precise GIS coordinate distribution map.

Figure 2 Structural Evidence Profile Diagram for Two Types of Sample Communities

Source: Huafa Community data [16]; Jiangjunshan Community data [17-18].

Table 3 and Figure 2 reorganize scattered case material into four layers: sample conditions, demand data, problem evidence and construction response. Huafa’s 3,000-plus feedback items establish that problem identification there began from resident demand, while the finding of nearly 200 buildings without dedicated accessible routes locates the problem in space. For Jiangjunshan, the figure of 64.3% without property management explains why renovation on its own will not hold. Operation and community governance have to be built into the renewal program. Figure 2 is drawn as an evidence profile rather than a mapped coordinate layout, since the public information available does not support point-located GIS analysis and a map would imply a precision we do not have.

2.4 Coding Rules and How the Deduction Proceeds

Problems have a way of suggesting their own solutions too quickly, and the six-step coding frame used here is meant to slow that down. Step one records a verifiable fact, for instance that nearly 200 residential buildings have no dedicated accessible route. Step two assigns it to one of six categories: spatial fragmentation, slow-mobility obstruction, service mismatch, missing accessibility, poor ecological adaptation, weak governance and operation. Step three asks which daily activity chain is broken: an older resident's trip for groceries or a clinic visit, a child's journey to school, a family moving with a stroller. Step four states the spatial mechanism, which might be a discontinuous change in level, a pedestrian-vehicle conflict, or opening hours that do not match when people are free. Step five selects the strategic response. Step six converts that response into an indicator that can be measured or at least recorded. Where a conclusion rests only on general inference from the literature, it is marked as a mechanism inference and not presented as something measured in the samples.

Evidence is graded at three levels. Level A covers explicit facts and figures from government bodies, official case collections or legal standards. Level B covers verifiable site facts appearing in public project reports or professional case material. Level C covers inferences the authors draw from activity chains and spatial mechanisms. Levels A and B here mainly answer whether a problem exists. Theory, together with Level C mechanisms that recur across both cases, answers why it affects people of every age and which strategy fits better. That division is what allows the paper to make planning arguments without claiming more than the public evidence will carry.

3 WORKING THE SECONDARY SURVEY DATA: FACTUAL EVIDENCE TO PROBLEM DIAGNOSIS

3.1 Huafa Community: Resident Feedback, Facility Gaps and What Was Built

The public material on Huafa covers the full loop of assessment, identified problem and construction. Working to the Comprehensive Community Development Standards, the community ran health assessments at both housing and neighborhood level and collected over 3,000 opinions and suggestions by questionnaire [16]. Raw frequencies and distributions are not disclosed in the case study, so no percentages are calculated here; a claim such as "the issue residents care about most accounts for X%" would not be supportable. The officially stated "main problems identified in the health assessment" were instead coded thematically, which yields seven clusters: gaps in education and elderly care provision; shortages in public transport and parking; too few sports facilities; accessibility works lagging behind; aging infrastructure in the older compounds; digital services; and consultation mechanisms.

The single most diagnostic spatial finding is that "nearly 200 residential buildings lack dedicated access routes for persons with disabilities" [16]. A few ramps, then, are not a measure of accessibility. Building entrances, community roads, bus stops, service facilities and activity areas have to be assessed as one continuous system. The rest of the demand profile points the same way. Residents asked for public transport and for sports facilities such as basketball, badminton and table tennis courts; the assessment also recorded no kindergarten, weak primary and secondary school provision and insufficient senior meal services. Daily life and daily movement are not separable concerns. A full complement of facilities will still fail an age-friendliness test if there is no continuous walkable route to reach them.

Construction at Huafa also tells us something about whether the responses worked. Four new micro-bus stops, 500 parking spaces and 100 public charging points indicate that the transport package addressed public and private mobility together. On the service side, the senior canteen serves around 12,000 meals a year and delivers to 230 residents, and the Senior Citizens' University enrolls close to 2,000 students a year across 54 classes. Figures of this kind make a point that construction data cannot: once the works are finished, what matters is whether the service keeps running [16]. The value of the Huafa case is not that every strategy can be shown to have succeeded. Its value lies in showing that a complete community must assess its facilities, its accessible routes and its operating arrangements inside a single life-cycle frame.

3.2 Jiangjunshan Community: Contiguous Infrastructure Gaps and Governance Conditions

Governance at Jiangjunshan looks nothing like Huafa. The public data record 33.2 hectares, with every residential compound built before 2000, which classes all of them as older communities; 18 of the compounds have no property management service, or 64.3% of the total [18]. That proportion is a statement about governance structure. When unmanaged compounds are embedded among managed ones in that ratio, cleaning, planting, municipal roads, parking, public resources and facility maintenance stop being soluble compound by compound. Spatial management that crosses boundaries needs planning and operation organized across the whole area.

The 2023 Jiangjunshan Residential Complex Environmental Improvement Project gives a closer spatial view. The complex was completed in 1990 and holds 312 households in 23 residential buildings plus two public buildings, around 31,308.5 square meters of floor area. Public reports flag aging infrastructure, disordered planting, no separation of pedestrians and vehicles, too little independent pedestrian space and insufficient parking. The works cover facades, public space, planting, parking, signage, the circulation network, recreational facilities and fire safety [17]. Categories such as "slow-mobility obstruction" and "spatial fragmentation" are not borrowed abstractions in this light. They follow from three concrete dimensions: how pedestrians and vehicles are arranged relative to each other, whether pedestrian space is independent, and how public space is organized.

Jiangjunshan operates a "1+4+N" community stewardship model, with a smart service platform coordinating resident services, urban management, public resource operation and property management [18]. For this paper the mechanism matters because it moves operational governance out of the conclusions and back into the diagnosis. The reasoning is

simple enough: where the maintenance body and the funding line are undefined, a newly installed facility can end up outside anyone's remit. The Jiangjunshan chain therefore reads as a high share of compounds without property management, leading to fragmented management boundaries between compounds, leading to public space and municipal facilities that cannot be maintained reliably, leading to a requirement for integrated renovation and unified operation. Huafa's chain runs differently, from demand assessment to service gap filling to spatial accessibility to sustained operation, and the two are complementary rather than competing.

3.3 Problem Types and the Evidence Table: From Description to Traceable Judgment

Table 4 Current Issues, Evidence, and Logical Analysis for Aging Communities in Zhuhai

Problem Types	Sample Evidence	Affected Entities / Activity Chain	Mechanism Judgment	Evidence Level
Space Debris Type	The Jiangjunshan Demonstration Unit explicitly states that public spaces, greenery, and parking should be planned in an integrated manner; Huafa will utilize space beneath bridges and existing marginal spaces to establish additional activity areas [16-17].	Children's play, family care, elderly social engagement, youth sports	Available open space ≠ effective public space; parking congestion, single-purpose facilities, and marginal plots disrupt spatial continuity.	A/B
Slow-Traffic Blocking Type	Jiangjunshan lacks separated pedestrian and vehicle flows and dedicated pedestrian spaces [17]; Huafa has added micro-bus stops and improved slow-traffic infrastructure [16].	School commutes, grocery shopping, medical visits, public transit transfers, returning home at night	Key transition points affect multiple age groups simultaneously; localized paving cannot substitute for continuous pathways.	A/B
Service Mismatch	Huafa Health Check identified weaknesses in early childhood education, senior cafeterias, public transportation, and sports facilities [16].	Childcare, elderly care, education, community services, sports	Missing facilities combined with mismatches in operating hours or locations increase the cost of daily tasks.	A
Accessibility Absence Type	Nearly 200 residential buildings in Huafa lack dedicated access routes for persons with disabilities [16].	Elderly individuals, wheelchair users, families with strollers, individuals with temporary mobility limitations	A single-point ramp cannot guarantee full accessibility throughout the entire journey from residence to destination.	A
Poor Ecological Adaptation Type	Zhuhai's high-temperature, rainy, typhoon-prone environment, combined with general durability risks for pavement, drainage, and facilities in aging communities [18-19].	Walkability for all age groups (walking, stopping, traveling after heavy rain)	Coastal climate risks must be translated into performance attributes: shading, drainage, weather resilience, and post-disaster recovery capabilities.	A/C
Weak Governance and Operations Type	Among the 28 residential complexes in Jiangjunshan, 18 lack property management services (64.3%); these complexes adopt the "1+4+N" comprehensive management model [18].	Facility usage, maintenance, sharing rules; public resource operations	Spatial challenges span property rights and management boundaries; therefore, design and organizational mechanisms must be transformed in tandem.	A

Source: coded by the authors from [19], [16] and [17-18]. Level C entries are mechanism inferences, not measurements taken in the samples.

For each problem type, Table 4 answers the question of where the evidence sits. Weak governance and operation is not entered as a closing remark about "strengthening multi-stakeholder collaboration", which is how such findings often appear. It rests on the 64.3% of Jiangjunshan compounds without property management. Accessibility is likewise not a report of older residents finding it hard to get around. It rests on nearly 200 Huafa buildings without dedicated access routes. With the problems classified on that basis, the analysis can move to demand.

3.4 An All-Age Demand Matrix Built on Daily Activity Chains Rather than Age Brackets

Designing for every age does not mean giving every age group the same facilities. It means working out what each group does over the course of a day, where the risks sit in that sequence, and which requirements they hold in common. Children, young adults, caregivers and older residents do need different things from space. Their shared requirements are nonetheless substantial: continuous footways, shade, lighting, public toilets, seating, accessibility features and convenient services. Setting this out as a matrix is a way of not ending up with the standard answer of a children's playground plus a rack of senior fitness equipment.

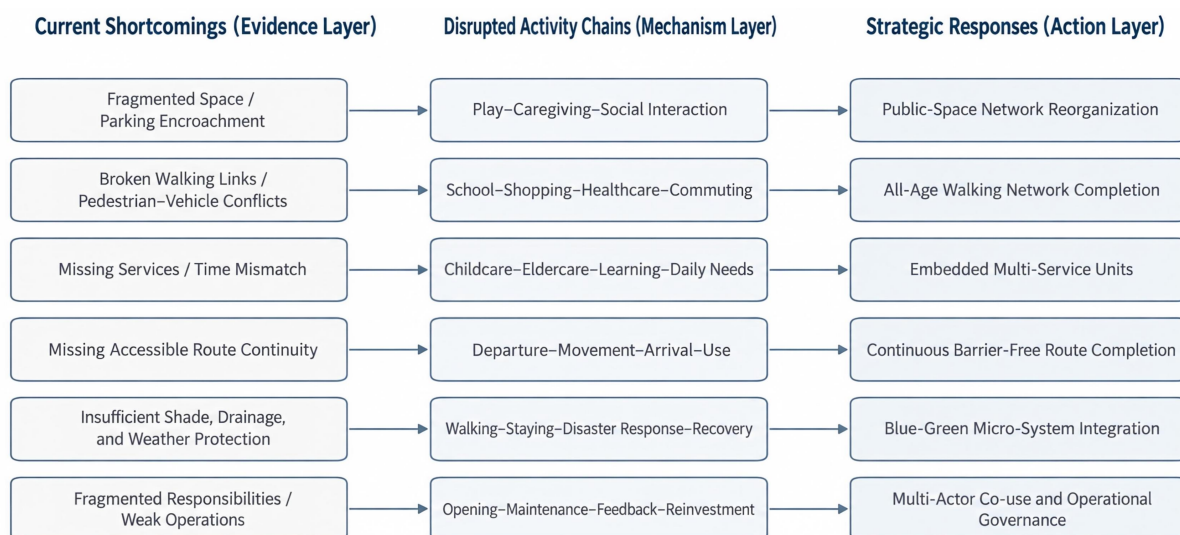
Table 5 Daily Activity Chain – Spatial Demand Matrix for All Age Groups

Population	High-Frequency Activity Chain	Typical Time Period	Key Spatial Requirements	Primary Risk Points	Shared Foundation
Children	Residence → Ground-floor activities → School/Early Childhood Care → Community events	After school or weekends	Safe school commute, visual supervision, natural play, low-conflict play areas	Vehicle access points, obstructed visibility, excessive hard surfaces	Continuous pedestrian walkways, shading, lighting, public restrooms
Youth	Home → Public Transport/Cycling → Workplace → Nighttime Exercise/Social Activities	Morning/evening commutes, nighttime	Public transit transfers, bicycle parking, flexible exercise options, nighttime safety	Lighting shadow zones, limited activity space, time-based restrictions	Slow-traffic infrastructure, composite spaces, smart services
Family/Caregiver	Pick-up/drop-off → Grocery shopping → Childcare → Companionship → Short break	Morning/evening peak hours, weekends	Stroller access, short-term parking, seated care, seamless service	Dispersed facilities, detouring routes, elevation changes, lack of adjacent space	Accessibility, community-friendly service routes, edge seating, comprehensive services
Elderly	Home → Morning exercise → Shopping → Medical visits → Neighborhood interactions	Early morning, morning, evening	Smooth paths, handrails, anti-slip measures, frequent rest stops, health services	Stairs, elevation changes, slippery surfaces, long distances without shade	Continuous walking routes, shaded rest areas, hygiene services, familiar spaces

Source: compiled by the authors from age-friendly and child-friendly research [3-12] together with the sample evidence in Table 4.

Table 5 is the layer between problem and policy, and it is usually the layer that goes missing. Separating pedestrians from vehicles ranks high here not because a design code says so, but because that one failure interrupts several activity chains at once: children going to school, families with strollers, older residents shopping, young adults commuting. Insufficient shade behaves similarly rather than affecting older residents alone, since in a hot and humid climate it lowers everyone's willingness to walk or to stay outdoors. Priority, on this logic, follows the reach of an activity chain instead of the administrative rank of a facility category.

3.5 Closing the Loop: Spatial Deficiency, All-Age Demand, Strategic Response



Inference rule: Begin with traceable evidence, then diagnose how activity chains are disrupted, and only afterward select strategies; do not infer "problem data" backward from strategies.

Figure 3 Coupled Derivation Diagram – "Spatial Weakness – Activity Chain – Strategic Response"

Source: constructed by the authors from the coding relationships in Tables 4 and 5.

Figure 3 sets out a derivation that papers in this field tend to skip. The source deficiency belongs on the left. The middle must show how that deficiency breaks a daily activity chain. Only then, on the right, does a spatial strategy appear. Take the nearly 200 buildings without accessible routes. The finding is first classified as a break in the accessibility chain, then assessed for its effect on the whole trip from home across community roads to a facility, and only after that

does continuous whole-journey accessibility work emerge as the response. The alternative, which is common enough, is to commit to six strategies and then look for problems that fit them. For climate adaptation the sample evidence is not quantitative, so the derivation there runs on Zhuhai's environmental conditions and general spatial mechanisms, and is labeled as such rather than dressed up as a survey result about resident dissatisfaction.

4 ALL-AGE-FRIENDLY SPATIAL STRATEGIES UNDER MODERN MARITIME CITY GUIDANCE

Six groups of strategy follow from the couplings in Figure 3. They are not a menu of parallel options. They are ordered across five concerns: the safety baseline, continuity of daily life, integrated sharing, climate adaptation and sustained operation. Figure 4 shows the arrangement, which is built on continuous all-age activity chains and resilience to the marine climate. The six are meant to be matched to a particular community's problem set, not applied as a uniform package.



Figure 4 Strategic Framework for All-Age-Friendly Spaces Under the Guidance of Modern Marine Cities
Source: relational diagram constructed by the authors from Figure 3.

4.1 Public Space as a Network: Leftover Land Reorganized into Three Tiers of Node

Where space is fragmented, a new central square is rarely the answer. The more productive first move is to survey what is already there and underused: vacant lots, mezzanine levels, idle ground-floor units, roadside strips, the space under bridges, awkward corner plots. Plotted on one base map, these can be organized into three tiers, namely a central shared node, cluster activity nodes and building-level micro-nodes. The central node carries community meetings, cultural events, parent-child activities and occasional markets. Cluster nodes take children's play, youth sport and older residents' socializing. Micro-nodes supply seating, shade, a place to garden and somewhere to pause for a few minutes. Huafa's conversion of vacant land under Xiangshan Bridge into a sports pitch, a cultural park and fitness trails indicates how far reactivating existing space fits the constraints of these communities better than acquiring new land [16]. A network also implies designing for composite scenarios rather than fixed functions. Movable furniture, foldable play equipment, flexible paving, edge seating and sightlines that let a carer keep watch all allow one space to serve different users at different hours. The transition between active and quiet zones can be handled with planting, the placement of seats or a slight change in level, and does not require a fence. It also pays to keep the memory value of a place: an old tree, a path people have always used, the corner where neighbors already gather. Keeping them avoids both the maintenance bill and the sense of dislocation that tends to follow wholesale demolition and replacement.

4.2 An All-Age Slow-Mobility Network: Why Destination-Led Routes Beat Patch Repairs

Slow-mobility work is best planned backward from where residents are going. Treat schools, kindergartens, markets, bus stops, clinics, the community center and public activity space as the destinations, and the bottlenecks become locatable: parking that blocks the footway, physical obstructions, changes in level, intersections with poor visibility,

stretches without lighting. The Jiangjunshan demonstration unit records exactly this, naming the absence of pedestrian-vehicle separation and of dedicated walking space [17], while Huafa strengthened internal circulation with the Z12 circular micro-bus and four additional stops [16]. Both cases point toward reading a trip as one continuous thing, from front door to destination.

Four route types are worth distinguishing: a safe school journey for children, a health and exercise loop suited to older residents, a family convenience route and a commuting route. Color-coded paving for each is unnecessary and usually counterproductive. They should share the same infrastructure, meaning a continuous pedestrian clearway, ramps, shade, lighting and rest points, with safety reinforced where it is actually at risk: vehicle crossings, bus interchanges, school gates. Details decide whether this works. Ramps need attention at their start and end points and at turning radii. Seats need backrests and armrests, positioned so that a carer can see a child. Lighting at night must reach building entrances and the edges of activity areas. Concentrating limited money on the junctions that affect the greatest number of movements is the point of the exercise.

4.3 Embedding Composite Service Units by Sharing Space and Time

Huafa's health check found gaps in early childhood education, elderly care, public transport and sports provision. Meeting each of them with a dedicated space would exhaust the land and the budget of an aging community fairly quickly. The alternative starts from reactivating what the community already holds: collectively owned premises, mezzanines, idle commercial units, ground-floor public areas. These can be run as composite service units combining fixed basic services, flexible activity space and professional services by appointment. High-frequency counters such as consultation, health monitoring and parcel collection stay immediately accessible. Reading, meeting and parent-child areas can be reconfigured with movable partitions. Lower-frequency services, among them legal advice, repairs and specialist medical consultation, run on booked sessions.

Stacking functions onto one floor plan is not composite use. Operating hours and management interfaces have to be designed in. Childcare and children's activities need controlled access and proper sanitation. Elderly health services should sit on an accessible route. Evening use by younger residents needs arranging so that noise and light do not reach the flats above. Storage of equipment, cleaning protocols, the booking system and the responsible party all need settling before anything opens. The usage figures from Huafa's senior canteen, Senior Citizens' University and comprehensive service hub suggest that "complete" is not achieved at handover. It is produced over time by keeping facilities, routes and operation aligned.

4.4 Continuous Accessibility and Universal Safety Beyond the Demonstration Ramp

Nearly 200 Huafa buildings without accessibility facilities is the best-evidenced problem in this study. Remediation should start at each building entrance and work outward, checking thresholds, longitudinal and cross slopes, slip resistance, handrails, lighting and rest points along community roads, through activity areas and service facilities, as far as the bus stop. Where a change in level cannot be resolved in one phase, the shortest alternative route should be provided and signed clearly. One demonstration ramp does not substitute for systematic repair.

Universal safety must account for a child's eye level and for how materials behave in a humid coastal setting. Obstructions that block sightlines at building corners and parking entrances should go. Protective edges that incorporate seating and planting can keep vehicle routes clear of activity space. Surfaces need to stay slip-resistant in rain; drainage covers and tree-pit edges should not stop a wheelchair or a stroller. Universal design does not aim at a dedicated zone per group. Its test is whether a child, an older resident, a carer, a wheelchair user and everyone else can use the same route safely.

4.5 Blue-Green Micro-Systems: From Beautification to Marine Climate Performance

What marks out a coastal city, in daily terms, is how its space performs under heat, heavy rain, strong wind and salt spray. Blue-green infrastructure should be distributed, kept small and made easy to maintain, and threaded into routes and sites rather than collected in one feature. Roof runoff can be led to sunken green areas through open channels, vegetated swales or rain gardens. Parking and activity surfaces can be partly permeable. Trees belong first along the busiest pedestrian routes and over the places where people sit, with species chosen for wind resistance, salt tolerance, pest and disease resistance and a root system that suits the situation. Safe overflow after rain and a quick return to normal use matter considerably more than an ornamental water feature with a complicated specification.

Blue-green systems also give shared use something to work with across age groups. Children can watch a rain garden do its job, older residents can take on community planting, and families and younger adults can be drawn into routine upkeep through adoption schemes or volunteering. Local cultural expression gains from moving past marine symbolism toward things people experience directly. How rainwater moves, which plants tolerate salt, what the coastal wind does, what longer-standing residents remember: these can furnish a workable environmental education site, and they let ecological function, local identity and public activity reinforce one another.

4.6 Intergenerational Sharing and Operational Governance After the Works Finish

Conflict is to be expected. Children's play against older residents' rest, evening activity against people trying to sleep, a temporary market stall against the flow of pedestrians. Spatially these are handled with active-to-quiet gradients, buffers at the edges and several entrances so that footfall disperses. In time, they are handled with set hours, booking and a staggered activity calendar. Movable, foldable and reusable components add room to maneuver. Sharing a space does not require everyone in it to be doing the same thing. What it requires is that people within one spatial system remain visible to each other, are not excluded, and could interact if they chose to.

With 64.3% of Jiangjunshan's compounds lacking property management, operational governance is a precondition for spatial renewal rather than a postscript to it. Implementation needs a public space access list, a maintenance responsibility list, an inspection schedule for facilities and a channel for resident feedback. Slow-mobility routes, shared facilities and public resources that span several compounds need a named coordinating body, whether the subdistrict office, a community organization or a centralized management entity. Resident participation should also move beyond approving or rejecting a scheme toward saying which spaces come first, how they are to be shared and how disputes get settled. Space and organization have to change together. Otherwise these places fall out of use not long after the ribbon is cut.

4.7 Combining the Strategies and Ranking Priorities

Table 6 Strategic Combination and Priority Ranking for the Six Major Issues

Primary Type	Prioritized Strategy Portfolio	Primary spaceborne platforms	Implementation Timeline	Evidence Correspondence/Expected Improvement
Space debris type	Tiered Public Space Network + Flexible Sharing Scenario	Plot of land between buildings, under bridges, above-ground levels, or corner plots	Mid-term quality improvement	Addressing the inefficiency of public spaces; enhancing multifunctional use and intergenerational sharing.
Slow-acting blocking type	Destination-oriented patchwork + reconfiguration of human-vehicle relationships	Community roads, entrances/exit points, and bus shuttle services	Recent Security First	Respond to the situation where vehicle flow at Jiangjunshan has not been separated; restore the continuity of the activity chain.
Service Mismatch Type	Existing property integration + staggered sharing model + reservation-based service	Ground-floor offices, community center, vacant commercial space	Mid-term Integration	Addressing the shortcomings in Huafa Health Check-up Services; enhancing service accessibility and utilization efficiency
Disability Absence Type	Residential – Road – Facility – Full-Cycle Continuous Repair	Building entrance, ramps, site, surrounding streets	Prioritize the baseline recently	Addressing accessibility challenges in nearly 200 buildings; ensuring easy access for wheelchairs, strollers, and elderly individuals.
Poor ecological adaptation type	Blue-Green Microsystem + Shading and Drainage System + Weather-Resistant Materials	Pathways, parking areas, green spaces, and activity venues	Short-term milestones + long-term scalability	Enhance thermal comfort, drainage, and post-typhoon recovery
Weak Governance and Operations Type	Responsibility Checklist + Community Concierge Service + Annual Re-evaluation	Public spaces, multifunctional facilities, and cross-community resources	overall process	Address issues related to the absence of property management or multiple stakeholders; prevent buildings from remaining idle or falling back into an unmanaged state.

Source: compiled by the authors from Figures 3 and 4 and the sample evidence.

Table 6 ties the strategies to how hard each should be pushed, and when. In the near term, works should hold the baseline of safety, accessibility and inclusion. Over the medium term, public space can be restructured and composite services introduced. Ecological networks and operating mechanisms are then kept under continuous revision. Sequencing this way stops a limited budget being spread evenly across every facility category, and it keeps priority tied to the strength of the evidence behind a problem and the reach of the activity chain it disrupts.

5 IMPLEMENTATION PATHWAYS, CASE COMPARISON AND OUTCOME ASSESSMENT

5.1 The Full-Cycle Loop

Calling a renewal project finished when the contractor leaves leaves the useful questions unasked. Is the new facility being used? Have neighborhood disputes fallen? Is maintenance keeping up? The process is treated here as five phases that feed into each other. Identification establishes four baseline records: spatial layout, facilities, activity chains and responsible bodies. Classification picks out the priority problems by weighing safety risk, the number of people affected and what can realistically be delivered. Renewal selects and executes the strategy package. Operation sets the rules for access, booking, maintenance and programming. Evaluation returns site inspection, resident feedback and maintenance records to the identification stage for the next round.



Figure 5 Implementation Closed-Loop Diagram for Recognition, Classification, Update, Operation, and Evaluation
Source: derived by the authors from this research.

The feature that matters in Figure 5 is the return path from evaluation to identification. Benches installed during a renovation do not by themselves demonstrate that age-friendly design is working. The question is whether older residents actually sit on them, whether those benches are the ones placed along routes people use, whether water stands there after heavy rain, whether the seats go unused because nothing shades them. A composite activity room judged by floor area is assessed on the wrong variable. How many hours it opens, which groups use it and at what times, and who is responsible for upkeep are the variables that tell you whether to extend it next year or simply change the operating rules first.

5.2 Huafa Community: Demand Assessment Through to Service, Route and Operation

At Huafa the first layer of verification is how resident demand got the project onto the construction list at all. After the assessment and the collection of over 3,000 feedback items, the published case recorded a specific set of deficiencies: no kindergarten, inadequate senior meal provision, too few bus routes and stops, a shortage of sports facilities and missing accessible routes in roughly 200 buildings. The response was a new town kindergarten, a senior meal center, a Senior Citizens' University, sports facilities, a micro-bus service and accessibility works [16]. That sequence maps onto the fact-problem-response reasoning used throughout this paper.

The second layer asks whether facilities and space actually work together. The Z12 circular micro-bus now has four additional stops, rest areas have been added along the fitness trail, and community roads and parking have been reworked. The intention is that services are not merely present but sit on the routes residents already travel. On parking, 500 spaces and 100 public charging points were added, charging accounting for 20% of the new capacity, which suggests static traffic provision beginning to track a change in what residents drive. What this did to the pedestrian environment is another matter, and it will only be answerable by monitoring parking discipline and footway accessibility over time.

The third layer shows operational data functioning as evidence about space. The senior canteen assists around 12,000 people a year and delivers meals to 230 residents; 1,344 older residents are signed up to the family doctor program; the Senior Citizens' University draws close to 2,000 participants annually [16]. Counting completed facilities is the wrong summary measure for a community of this kind. Service uptake is the outcome indicator. Following the framework used here, Huafa's next phase should move from filling gaps to building continuity, which means canopy shade, blue-green micro-systems, intergenerational shared space, and walking conditions good enough that getting from one facility to the next is unremarkable.

5.3 Jiangjunshan Community: Single-Compound Repair, Contiguous Plots, Unified Operation

The first layer of analysis at Jiangjunshan sets the scale at which governance must operate. Of the 28 older compounds here, all of them predating 2000, 18 have no property management service. The object of renewal is accordingly not a set of well-defined individual compounds but an area in which management and public resources are badly fragmented

[18]. In that situation, a cross-compound slow-mobility framework, shared public nodes and a single maintenance mechanism are a better use of resources than reproducing the same landscape treatment in every compound.

The second layer points to a shortage of space in the demonstration unit. The Jiangjunshan Residential Complex holds 312 households in 23 residential buildings and two public buildings, and the problems are familiar: no separation of pedestrians and vehicles, too little independent pedestrian space, persistent parking pressure [17]. These correspond to the slow-mobility obstruction and spatial fragmentation categories set out earlier. Renewal here should put pedestrian continuity first, and public space should be allocated complementarily according to who actually lives in each compound, rather than on the assumption that every compound must be self-sufficient.

The third layer concerns the organizational innovation of the community service hub. The “1+4+N” model brings together a smart platform, resident services, urban management, public resource operation and property management [18]. Where spatial problems cross property boundaries, in other words, planning and design have to adapt organizationally as well. The case supports treating weak governance and operation as a problem category in its own right. It is also a reminder that effectiveness should be assessed on maintenance response times, on whether facilities can be reached and on what residents report, not on the floor area renovated.

5.4 Comparing the Two Cases: Different Strategy Intensities in One Framework

Table 7 Comparison of Evidence, Issues, and Strategies for Huafa and Jiangjunshan Communities

Comparison Dimension	Huafa Community	Jiangjunshan Community	Implications for Strategy Selection
Update Start Point	Comprehensive community pilot program; relatively complete service and governance resources	Consecutive older residential communities lacking property management, with prominent boundary fragmentation	A unified renovation checklist cannot be applied uniformly.
Primary Requirement Evidence	Physical examination + over 3,000 questionnaire feedback items identifying facility shortcomings [16]	Old residential complex composition, proportion of unmanaged properties, on-site project issues [17-18]	The former focuses on addressing demand gaps; the latter emphasizes governance and spatial frameworks.
Leading Problem	Service mismatch, lack of accessibility, need for quality improvement	Slow-moving obstacle clearance, space fragmentation, inadequate governance and operational capacity	Priority strategies must adapt to the evolving dominant problem.
Typical Implementation Example	Early childhood education, elderly care, micro-public transport, sports facilities, parking, and accessible mobility coordination	Continuous Urban Redevelopment + “1+4+N” Community Service Hub	Space engineering and operational organization must advance in parallel.
Next Phase Key Focus	Evolving from “having facilities” to continuous accessibility, integrated sharing, and climate resilience	Deepening the transition from “unified management” to cross-cell slow-moving traffic, shared nodes, and tiered services	Well-established communities should focus on quality enhancement; weaker communities must prioritize basic services and governance.
Evaluation Focus	Facility usage frequency, walkability, shared usage periods, blue-green performance	Maintenance response, public space usage, parking/slow-traffic conflicts, management coverage	Evaluation indicators must align with the specific problem type.

Sources: [16], [17-18] and the evidence-chain comparison above.

Table 7 makes it clear that a six-category framework does not mean every community gets all six at full strength. Huafa already has a serviceable base, so additional facilities return less at the margin than improvements in route continuity, integrated sharing and climate performance. Jiangjunshan has to deal with the cross-compound slow-mobility network, the relationship between parking and pedestrian movement, and unified operation before intergenerational scenarios are worth expanding. Comparing the two is what validates categorical matching: one analytical framework should produce different strategy intensities, not identical recommendations.

5.5 Outcome Indicators and the Next Survey Cycle

Because the study works from secondary public data, it cannot report statistical significance for before-and-after conditions. It can specify what should be collected next. The indicators follow a “few but sustainable” principle across five domains: spatial, usage, social, ecological and governance. They include site observation of route breakpoints, standing water, shade and maintenance response, together with usage records and resident feedback. Post-construction records are recommended at three months, at one year and annually thereafter. In Table 8, “expected direction” states an evaluation objective; it does not report a result measured in this study.

Table 8 Indicator System for Evaluating Age-Appropriate Renewal Outcomes

Evaluative Dimension	Core Metrics	Recommended Data Acquisition Method	Evaluation Timeline	Expected Direction
Spatial Performance	Number of key pedestrian discontinuities; barrier-free continuous sections; public nodes within a 15-minute walking distance	Spatial verification, route auditing, GIS/pedestrian surveying	Before renovation; Completion; 3 months; 1 year	Reduced breakpoints, improved continuity
Usage Performance	Number of users per time period / Duration of stay; Facility operating hours; Combined usage frequency	Targeted behavioral observation, open-ended recording, appointment-based data	3 months, 1 year, annual	More balanced user distribution and stable usage
Social Performance	Number of intergenerational sharing activities; types of conflicts/complaints; resident co-management participation	Activity logbook, interviews, complaint records, meeting minutes	Quarterly, Annual	Increased sharing, reduced conflicts, enhanced participation
Eco-Performance	High-frequency path continuous shading; typical water accumulation points; recovery time after extreme weather events	Crown/shading surveying, post-rain inspection, maintenance records	Summer, rainy season, after a typhoon	Enhanced thermal comfort, reduced water accumulation, accelerated recovery
Governance Performance	Repair request response time; Facility integrity rate; Maintenance responsibility coverage; Funding sustainability	General Manager/Property Management Work Orders, Inspection Logbook, Annual Budget	Monthly, Quarterly, Annual	Accelerated response, clear accountability, maintenance stability

Table 8 closes the chain. Diagnosis used interruption of the activity chain as its criterion, so evaluation should not revert to counting newly installed facilities. Climate adaptation entered earlier as a performance dimension at community scale; in evaluation it becomes records of shade, standing water and recovery after extreme weather. Governance and operation entered as a problem type; in evaluation it becomes work order response times, facility integrity and the coverage of maintenance responsibility. The loop only closes if the evaluation frame and the diagnostic frame use the same terms.

6 DISCUSSION

6.1 Evidence Chains Rather than Accumulated Text: Where Planning Research Should Stop

The contribution here is not an additional set of figures but figures that do analytical work. Table 3 states where the samples and data come from. Table 4 states the basis for each problem. Table 5 states which activities are affected. Figure 3 shows how strategies are derived from problems. Table 7 explains why the strategies differ between cases. Table 8 sets out how to keep testing them after implementation. Where the visuals and the text correspond one to one, the paper is harder to write backward from a conclusion in search of supporting examples.

Empirical work does not require a questionnaire database that looks complete. The public record shows over 3,000 feedback items at Huafa, but the original items and their sub-item frequencies are not published. Manufacturing a figure, say “72.4% of residents regard parking as the most serious problem”, would cost the study more credibility than the missing number does. Secondary survey and evidence coding are used instead. What can be quantified is quantified; what cannot is kept as a factual description or a mechanism inference, with its evidence level stated. Under review, a clear account of where the evidence stops is more verifiable than a precise figure that was invented.

6.2 Modern Maritime City Strategy Compared with General Coastal Landscape Renewal

Coastal landscape projects are mostly concerned with the shoreline, the visitor experience and the city’s front door. Aging communities present a different problem: the high-frequency, fragmented and long-running demands of ordinary daily life. Defining the modern maritime city through spatial openness, blue-green permeability, slow-mobility continuity, functional complexity and climate adaptability changes what counts as success. Greenery is then assessed not only by area or visual composition but by whether canopies actually cover the busiest routes, whether the stormwater system has a safe overflow, whether things work again after a typhoon. Openness is assessed not by visual transparency but by whether people can pass through, stay and share the space under workable safety and management arrangements. On those terms the maritime city connects to community daily life substantively rather than iconographically.

6.3 All-Age Friendliness Is Not “Age-Friendly Plus Child-Friendly”

Age-friendly and child-friendly design each come with well-developed considerations, and adding one to the other tends to produce rigid zoning. Table 5 shows why. Continuous footways, legible signage, shaded rest points, accessibility, contact with nature and safe public space are valuable to every group. At the same time, what younger adults need from a community, in commuting conditions, evening use and space that can be reconfigured, indicates that renewal cannot be aimed only at “the old and the young”. All-age friendliness does not abolish dedicated space. It

places dedicated space inside a shared network, and reconciles competing requirements through spatial gradients, scheduling and operating rules.

6.4 Limitations and the Fieldwork That Should Follow

The evidence base here consists of official case-based health assessments, public project data and traceable cross-case comparison. Three limitations follow from it. The 3,000-plus feedback items at Huaafa were not published as raw questionnaire data, so the distribution of demand cannot be calculated. The public Jiangjunshan material concentrates on project and governance process and contains no consistent behavioral mapping before and after the works. No cross-seasonal microclimate measurement was carried out for shade, thermal comfort, standing water or post-typhoon recovery.

The paper does not, then, rank the six strategies by effectiveness, nor does it treat two communities as statistically representative of Zhuhai. Fieldwork should take this further, following Table 8: fixed-point behavioral observation, accessible route audits, canopy shade measurement and standing water mapping, before and after renovation. Tracking the same indicators at three months, one year and annually would turn a secondary-survey evidence chain into a longitudinal one grounded in the field.

7 CONCLUSION

This study has worked on the relationship between modern maritime city guidance, the renewal of Zhuhai's aging communities and designing for every age. Its aim was to rebuild, through a secondary survey of public data, three things that planning and design research often handles poorly: data that never enters the analytical derivation, illustrations that do not correspond to the text, and conclusions with no evidence-based feedback loop. Working from Huaafa's community health assessment, over 3,000 feedback records and its construction and operational data, supplemented by the 28 older compounds at Jiangjunshan, 18 of them unmanaged, and by its contiguous redevelopment program, it assembles a chain with six links: factual evidence, problem type, interrupted activity chain, spatial mechanism, strategic response, evaluation indicator.

What the evidence indicates is that the principal difficulty in Zhuhai's aging communities is not a shortage of facilities. It is a mismatch between fragmented existing space, continuous daily needs, a coastal microclimate and multi-party governance. On the five-dimensional framework of community spatial quality, six strategies are proposed: networked restructuring of public space, integration of an all-age slow-mobility network, embedding of composite service units, continuous accessibility across the whole journey, blue-green micro-system integration, and intergenerational sharing supported by operational governance. Huaafa is in a position to move from closing individual gaps toward continuous accessibility, integrated sharing and better climate performance. Jiangjunshan should first establish a cross-compound slow-mobility framework, shared public nodes and a unified operating system, and expand shared-use scenarios after that.

Implementation is framed as a loop of identification, classification, renewal, operation and evaluation, with five indicator domains, covering space, usage, society, ecology and governance, carrying the work into its next stage. The modern maritime city then stops being coastal imagery and becomes shade, drainage, openness, continuity, complexity and resilience that residents can perceive where they live. All-age friendliness, correspondingly, is less a list of facilities sorted by age bracket than the restoration of a continuous activity chain. For a subtropical coastal city such as Zhuhai, renewing aging communities has to move from one-off engineering toward governance of living space that is evidence-driven, matched to problem category and operated for the long term.

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