

Evaluating Sustainable Improvement in Suzhou Ancient City: Stakeholder Satisfaction, Sustainability Challenges, and Expert-Guided Pathways



Yinxue Weng^{1,2}, Oliver Ling Hoon Leh^{1*}, Marlyana Azyyati Marzukhi¹, Shiwang Zhou¹

¹ Faculty of Built Environment, Universiti Teknologi MARA, Shah Alam 40450, Malaysia

² School of Art & Design, Guangzhou City Construction College, Guangzhou 510925, China

Corresponding Author Email: oliver3979@uitm.edu.my

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<https://doi.org/10.18280/ijstdp.210309>

ABSTRACT

Received: 1 January 2026

Revised: 20 February 2026

Accepted: 25 February 2026

Available online: 31 March 2026

Keywords:

Suzhou Ancient City, Historic Urban Landscape, heritage-led regeneration, expert consultation, community participation, sustainable urban development, China

Historic city cores in fast-urbanizing settings routinely have to reconcile the protection of cultural heritage values with the demands of contemporary socio-economic life. Suzhou Ancient City (Gusu District)—a nationally designated historic and cultural city with internationally recognized heritage assets—illustrates how market-oriented renewal, tourism intensification, and aging infrastructure can generate both vitality and new sustainability risks. This article examines (a) how residents and commercial operators assess recent renewal outcomes and (b) which challenges and improvement strategies local experts prioritize for Suzhou's next phase of heritage-led urban development. The study uses a qualitative-dominant embedded case-study design, examining four redevelopment typologies within Suzhou Ancient City: a neighborhood market renewal, a commercial complex insertion, a themed tourism street, and an industrial-heritage creative campus. Evidence combines questionnaire surveys of residents ($n = 412$) and commercial operators ($n = 107$), structured field observations, and semi-structured interviews with ten experts spanning planning, architecture, heritage governance, and project delivery. Survey responses are summarized descriptively, with selected χ^2 association tests to probe distributive stressors linked to commercial upgrading; interview transcripts are thematically coded and cross-checked against on-site observations. Respondents generally rated baseline public-order conditions (e.g., perceived safety and the daytime sound environment) positively, while reporting notable gaps in service convenience, meaningful community participation, and the distribution of economic costs and benefits. Experts converged on an intertwined challenge set, encompassing (1) "hard" constraints such as aging underground infrastructure, waterlogging, and limited public space; (2) "soft" constraints including over-commercialization, homogenized place branding, and displacement pressures; and (3) governance constraints—fragmented responsibilities, weak deliberation mechanisms, and short-term performance incentives. The recommended strategy portfolio centers on incremental "acupuncture" renewal, nested multi-scale governance, people-centered heritage activation, and policy instruments that internalize tourism and commercial externalities. By linking stakeholder satisfaction evidence with expert-elicited strategy pathways, the study frames sustainable improvement in a heritage city as an integrated agenda encompassing liveability, authenticity, resilience, and governance capacity. It provides an empirically grounded framework for translating expert knowledge into feasible interventions that are both socially balanced and implementable in historic Chinese city cores.

1. INTRODUCTION

Historic city cores are increasingly expected to perform multiple—and sometimes conflicting—functions: to preserve cultural significance, to serve as everyday living environments, to support economic competitiveness, and to contribute to climate resilience and social inclusion. International doctrine has progressively reframed heritage from a static object of protection to a value-based and people-centered process. The United Nations Educational, Scientific and Cultural Organization (UNESCO) Recommendation on the Historic Urban Landscape (HUL) calls for integrating

heritage conservation with broader urban development goals, recognizing that tangible fabric, social practices, and natural systems form an interdependent whole [1]. Complementary International Council on Monuments and Sites (ICOMOS) principles likewise emphasize safeguarding historic urban areas through integrated planning, appropriate contemporary use, and governance arrangements capable of managing change [2, 3]. Yet, translating such doctrine into actionable strategies remains challenging in fast-growing cities where land markets, tourism, and redevelopment pressures reshape historic environments at high speed.

Suzhou provides a strategically important lens for

examining this translation challenge. As one of the oldest cities in the Yangtze River Delta, Suzhou traces formal urban foundations to 514 BCE [4]. Its historic core—widely referred to as Suzhou Ancient City—is characterized by a distinctive water–street morphology and a dense layering of cultural assets, including classical gardens inscribed on the UNESCO World Heritage List [5]. Suzhou was among the first batch of nationally designated historic and cultural cities in 1982, and municipal policy has repeatedly emphasized “comprehensive protection of the ancient cityscape” as a planning objective [6]. These designations have supported robust conservation institutions; however, they also elevate expectations that heritage will anchor economic development, including cultural industries and tourism growth.

In Suzhou Ancient City, water systems are not only scenic resources but part of everyday infrastructure and cultural identity. Research on Suzhou’s waterscape shows how canals historically organized mobility, commerce, and neighborhood life, producing a spatial culture in which water is embedded in the lived city [7]. More recent spatial vitality research confirms that the quality and accessibility of waterfront space remain important determinants of urban life in the ancient city, shaping perceptions of comfort, identity, and place attachment [8]. These characteristics make Suzhou an instructive case for sustainable improvement because they bind heritage integrity to environmental performance: drainage, water quality, and public-space maintenance directly affect both liveability and authenticity.

Across China, heritage-led regeneration has evolved from demolition-driven renewal toward incremental and conservation-oriented approaches, often framed as micro-regeneration or micro-regeneration. This shift is partly a policy response to contestation and adverse impacts associated with large-scale, property-led redevelopment [9]. In practice, however, incremental renewal can still produce tourism-driven commercialization, rising rents, and indirect displacement. In historic street environments, commercialization may enhance short-term vibrancy but undermine residential liveability and authenticity if everyday functions are crowded out [10]. Suzhou’s emblematic historic streets, such as Pingjiang Road and Shantang Street, have been studied as cases of tourism spatial re-organization and postmodern place consumption [11], illustrating how heritage value can be reinterpreted through leisure economies and branded experiences.

For Suzhou Ancient City, the challenge is not simply whether to develop, but how to guide development so that conservation and improvement reinforce each other rather than compete. Public investments in streetscapes, waterways, and cultural facilities may raise both amenity and land values, generating renewed interest from investors and visitors. At the same time, aging infrastructure, limited space for upgrades, and increasing climate-related risks (e.g., waterlogging) can produce cumulative liveability burdens for long-term residents. Moreover, historic city governance typically involves multiple departments and actors—planning, cultural relics management, housing, tourism, sanitation, traffic, and private operators—whose objectives and incentives may diverge. In this context, expert consultation is often relied upon to interpret doctrine, assess technical constraints, and propose interventions; yet expert recommendations can fail to translate into sustained implementation if they do not align with institutional capacity and stakeholder acceptance.

Within this article, the term sustainable improvement refers

to a balanced enhancement of (1) heritage integrity and authenticity, (2) resident liveability and social equity, (3) economic vitality compatible with heritage values, and (4) environmental resilience and long-term maintenance capacity. This definition aligns sustainability-oriented heritage management with broader global urban policy agendas such as the 2030 Sustainable Development Goals and the New Urban Agenda, which emphasize inclusive, safe, resilient, and sustainable cities [12, 13]. In a heritage city core, these global aspirations must be translated into locally relevant instruments, including infrastructure renewal, public-service provision, participatory decision processes, and market regulation capable of preventing the erosion of living heritage.

Two gaps motivate this article. Empirically, scholarship on Chinese historic districts has documented tourism commercialization and conservation dilemmas, but fewer studies combine stakeholder satisfaction evidence with expert-elicited strategy pathways across multiple redevelopment typologies within a single historic city core. Conceptually, experts are often discussed either as technical consultants or as instruments of state-driven planning, while their potential—and limits—as boundary actors who can bridge competing stakeholder interests receive less direct attention [14, 15]. Clarifying this bridging function matters because, in heritage contexts, “sustainable improvement” depends on both physical conservation and the social conditions that sustain living heritage.

To address these issues, the study examines Suzhou Ancient City using three forms of evidence: stakeholder surveys, on-site observations, and semi-structured interviews with domain experts. The analysis is organized around three applied questions: Which renewal outcomes are currently viewed as successful by residents and commercial operators? Which stressors and deficits matter most for sustainability? And which strategy portfolio do experts prioritize when navigating technical constraints and stakeholder tensions? The paper first reviews work on the HUL approach, heritage-led regeneration, participation, and the use of expert knowledge in policy. It then outlines the embedded case-study design and data sources. Results are reported in two layers—stakeholder perceptions and stressors across the studied redevelopment sites, followed by expert-diagnosed challenges and strategy pathways—before discussing feasibility, situating the findings in the literature, and proposing a context-appropriate improvement model for Suzhou. The final section summarizes the core findings and translates them into policy recommendations for the Suzhou Municipal Government.

2. LITERATURE REVIEW

2.1 Sustainable urban heritage and the Historic Urban Landscape approach

The concept of sustainability in heritage contexts extends beyond ecological performance to include cultural continuity, social equity, and governance capacity. In international heritage policy, the shift from monument-centred conservation toward landscape and value-based approaches has expanded the management unit from single assets to urban systems. The HUL Recommendation positions historic cities as “dynamic” environments where change must be guided rather than resisted, and where heritage values should be integrated into planning, disaster risk reduction, and socio-economic

development agendas [1]. In parallel, ICOMOS doctrinal texts for historic towns and urban areas emphasize the need for integrated conservation planning that respects historic character while enabling compatible contemporary life [2, 3].

Scholarly reviews have highlighted both the promise and implementation challenges of HUL. Rey-Pérez and Pereira Roders [16] found that HUL is frequently cited as a bridging framework, yet operationalization often remains partial due to limited indicators, unclear responsibilities, and insufficient community engagement. Veldpaus et al. [17] similarly argue that urban heritage must be embedded in forward-looking urban governance, which demands tools that align regulatory frameworks, investment decisions, and participatory processes. These insights imply that sustainability-oriented heritage management requires not only technical conservation solutions but also institutional arrangements capable of negotiating values among stakeholders and across scales.

A people-centered interpretation of heritage further emphasizes living communities as carriers of heritage value. International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM)'s living heritage guidance frames conservation as a process that sustains relationships between people and places, rather than only the physical fabric [18]. This perspective is especially relevant in historic city cores where residents' everyday practices—markets, neighborhood rituals, crafts, and social networks—contribute to authenticity and sense of place. From a sustainability standpoint, therefore, improvement strategies must consider how interventions affect the continuity of local life, not merely the visual integrity of streetscapes or buildings.

Operationally, HUL encourages toolkits that include (1) knowledge and mapping of cultural and natural attributes, (2) participatory planning and stakeholder engagement, (3) regulatory systems and financial tools, and (4) monitoring and evaluation [1]. This structure is important for Suzhou because it implies that sustainable improvement requires both physical interventions and governance instruments. In other words, managing change in the ancient city cannot be reduced to design aesthetics; it requires a continuous cycle of assessment, deliberation, implementation, and maintenance.

2.2 Heritage-led regeneration, tourismification, and social sustainability in historic districts

Heritage-led regeneration often aims to mobilize heritage assets for economic development, particularly through tourism, cultural industries, and place branding. In the tourism literature, historic streets and districts are frequently analyzed as consumption spaces where heritage is curated, staged, and commodified to meet visitor expectations [19]. The tourist-historic city is therefore an arena of negotiation between conservation, development, and everyday use, requiring governance choices about access, commercial functions, and the distribution of costs and benefits [20].

Commercialization and tourismification can deliver tangible benefits, including improved public space, job creation, and revenue for maintenance. However, they can also generate negative externalities, such as overcrowding, noise, waste, and increased housing and retail rents. Where these externalities reshape social composition and displace long-term residents or traditional businesses, the process intersects with gentrification dynamics. Tourism gentrification, in particular, describes how visitor-oriented redevelopment can transform residential neighborhoods into leisure landscapes,

often accelerating rent gaps and displacement pressures [21, 22]. Zuk et al. [23] emphasized that public investment can unintentionally catalyze displacement if protections and redistributive instruments are not embedded in project design.

In the Chinese context, heritage-led redevelopment has been studied as a hybrid of state-led planning and market-driven commercialization. Shin [24] documented how conservation and revalorization in Beijing's Nanluoguxiang produced cultural vibrancy while also intensifying commercialization and social change. Zhai and Ng [25] showed that regeneration can reshape social capital and community dynamics, with impacts depending on whether residents remain active stakeholders. Verdini [26] examined the emergence of civil society roles in regenerating historic urban areas in Nanjing, Suzhou, and Shanghai, suggesting that participation remains uneven and institutionally constrained.

Suzhou's historic streets provide a particularly influential set of cases for understanding tourismification. Wang et al. [11] analyzed Pingjiang Road and Shantang Street as examples of postmodern tourism spatial organization, highlighting how heritage streets become themed environments structured around visitor mobility and consumption. Yu [10] further examined the residential-tourist relationship along Pingjiang Road, identifying tensions in privacy, publicity, and boundary negotiation as tourism intensifies. These studies collectively indicate that Suzhou's heritage-led development has produced both revitalization and liveability concerns, underscoring the need for strategies that maintain resident presence and daily functions alongside tourism economies.

Recent national and local narratives increasingly frame heritage as an asset for building urban competitiveness and quality of life. For example, public-facing reporting has highlighted renewed social functions in renovated markets and historic blocks, including Shuangta Market's repositioning as a social space rather than merely a transactional site [27]. However, such narratives also risk emphasizing flagship achievements while under-reporting distributive effects such as rent burdens and reduced residential affordability. In a sustainability frame, the question is therefore not whether heritage-led regeneration creates vitality, but whether the resulting vitality is compatible with long-term liveability and cultural continuity.

2.3 Expert consultation, evidence use, and participatory governance in heritage planning

Expert consultation is widely used in urban and heritage planning to interpret technical constraints, assess risks, and evaluate design options. In policy studies, experts can function as an "epistemic community," shaping shared understandings of problems and acceptable solutions, particularly where uncertainty and specialized knowledge are prominent [28]. However, the influence of expert knowledge depends on institutional receptivity and the fit between expert recommendations and political incentives [29]. Weiss [15] noted that research utilization in policy is often indirect or symbolic, used to legitimize decisions rather than determine them. This implies that expert-driven strategies must be designed with implementation pathways in mind, including alignment with budgetary mechanisms, administrative responsibilities, and stakeholder expectations.

Participatory governance literature emphasizes that sustainable urban outcomes cannot be achieved solely through

technical expertise, because values and distributive impacts are central to planning decisions. Arnstein's [30] ladder of citizen participation remains a foundational typology, distinguishing tokenistic consultation from genuine citizen power. Innes and Booher [31] argued that traditional, legally required participation often fails to create trust or learning, and that collaborative, network-based approaches can better address complex, multi-actor problems. For heritage planning, participation is also linked to legitimacy: communities are not only beneficiaries but co-producers of heritage value, especially where living practices and local identity are central [18].

Empirical research in China has repeatedly observed participation constraints. Li et al. [14] found that community participation in Chinese heritage management often remains limited in scope and influence compared with international practice. Their complementary state-of-the-practice assessment indicates that participation may be present procedurally, yet residents frequently have limited capacity to shape outcomes, partly due to governance structure and power asymmetries [32]. In such contexts, the role of experts can become dual: experts are expected to offer technical solutions while also mediating between state objectives, market actors, and community concerns. The central analytical question becomes whether expert-driven strategies can be operationalized in a manner that increases both sustainability performance and stakeholder acceptance.

From an implementation perspective, expert consultation can add value when it is institutionalized as an iterative learning process. Rather than providing one-off recommendations, experts can help define monitoring indicators, evaluate trade-offs, and facilitate cross-department coordination. However, where expert input is embedded in hierarchical approval chains without transparency, it may also be perceived as remote from local needs, reducing legitimacy. This implies that expert-driven strategies in Suzhou should be coupled with visible mechanisms for public feedback and adjustment, ensuring that evidence and expertise remain responsive to lived experience.

2.4 Adaptive reuse and property rights constraints in historic urban cores

Adaptive reuse is frequently promoted as a sustainability-oriented approach because it retains embodied energy, conserves cultural value, and can generate new economic and social functions. Bullen and Love [33] argued that adaptive reuse can contribute to sustainable urban environments by reducing demolition waste and leveraging existing fabric, while also creating cultural and economic value. However, reuse is not automatically sustainable; it may introduce commercialization pressures or functional incompatibilities if not carefully managed.

In dense historic cores, adaptive reuse is shaped by institutional and property rights conditions. Yung and Chan [34] identified implementation challenges that include regulatory complexity, stakeholder conflicts, and the need to reconcile conservation requirements with modern building standards. In Suzhou's Pingjiang Historic Block, Guo et al. [35] showed that unclear property rights can hinder conservation and reuse, increasing transaction costs and complicating relocation and compensation. Such constraints are highly relevant for Suzhou Ancient City, where mixed ownership patterns and small parcel structures limit the

feasibility of comprehensive redevelopment and make incremental, negotiated solutions more realistic.

Taken together, the above literature suggests that sustainable improvement in Suzhou Ancient City must be approached as a governance and value negotiation problem as much as a design problem. It must integrate HUL doctrine, address tourism and commercial externalities, incorporate participatory mechanisms that move beyond symbolic consultation, and deploy adaptive reuse in ways that protect authenticity and daily life. The next section explains how the present study operationalized these concerns through an embedded case-study design and multi-source primary data.

3. METHODOLOGY

3.1 Research design and case selection

The study adopts a qualitative-dominant, embedded case-study design to examine sustainable improvement challenges and strategies in Suzhou Ancient City. Case-study research is appropriate for complex urban governance environments where contextual factors, stakeholder interactions, and institutional constraints shape outcomes. An embedded design was used to capture variation across redevelopment typologies while maintaining a shared historic-core context.

The study area is Suzhou's historic core located in Gusu District. It contains dense historic residential neighborhoods, waterways, and mixed-use streets where everyday life and tourism overlap. The district is governed through multiple administrative and sectoral systems, including planning, cultural relics protection, tourism management, community services, sanitation, and traffic. This institutional complexity is central to the study because it shapes both the feasibility of physical upgrades and the effectiveness of participatory governance mechanisms. Suzhou's policy framing of "protection and utilization" indicates an official intent to couple conservation with contemporary development, but the operational challenge lies in aligning departments and stakeholders around shared sustainability targets [6].

Four redevelopment sites within Suzhou Ancient City were selected to represent typical heritage-led development pathways observed in contemporary Chinese historic cores. The cases include: (1) a neighborhood market renewal (Shuangta Market), representing everyday-service revitalization; (2) a commercial complex insertion (Huanyu Hui), representing mixed retail-led upgrading; (3) a themed heritage-tourism street (Shantang Haishi), representing tourism intensification; and (4) an industrial-heritage creative campus (Sulun Factory regeneration), representing adaptive reuse of industrial fabric. The diversity of these typologies allows assessment of whether perceived outcomes and expert strategies differ between community-oriented renewal and tourism-oriented or investment-oriented redevelopment.

3.2 Data collection: Surveys, observations, and expert interviews

Evidence was assembled from three complementary sources—stakeholder questionnaires, structured field observations, and semi-structured expert interviews. Two questionnaire instruments were administered within Suzhou Ancient City: a resident survey (n = 412 valid responses) and a commercial-operator survey (n = 107 valid responses). In

total, 519 valid questionnaires were obtained from 562 distributed (valid response rate = 92.3%). Table 1 summarizes the respondent profile.

Table 1. Survey respondent profile

Group	Characteristic	Category	n (%)
Residents (N = 412)	Gender	Female	312 (75.7%)
		Male	100 (24.3%)
	Age	18–29	44 (10.7%)
		30–49	65 (15.8%)
		50–64	172 (41.7%)
		> 65	131 (31.8%)
		Diploma	138 (33.5%)
	Education	Other	120 (29.1%)
		Undergraduate	98 (23.8%)
	Living area	Postgraduate	56 (13.6%)
		Gongyeyuan District	7 (1.7%)
		Gusu District	383 (93.0%)
		Huqiu District	15 (3.6%)
		Wuzhong District	7 (1.7%)
		Years living in area	1–10 years
10–20 years			29 (7.0%)
> 20 years	378 (91.7%)		
Commercial operators (N=107)	Business type	Food & beverage	75 (70.1%)
		Supermarket	16 (15.0%)
		Fresh fruit/vegetables	11 (10.3%)
		Beauty salon	1 (0.9%)
		Building materials/hardware	4 (3.7%)
	Location area	Pingjiang (Gusu)	36 (33.6%)
		Shuangta (Gusu)	59 (55.1%)
		Wumenqiao (Gusu)	12 (11.2%)
	Years in operation	1–5 years	41 (38.3%)
		6–10 years	48 (44.9%)
11–20 years		18 (16.8%)	
> 20 years		0 (0.0%)	
Local residents		40 (37.4%)	
Primary customers	Students	13 (12.1%)	
	Tourists	54 (50.5%)	

Questionnaire administration was conducted on-site in Suzhou Ancient City. Recruitment emphasized respondents whose daily living or work is situated in the neighborhoods surrounding the four selected redevelopment cases, so that responses reflect direct experience with the renewal environments examined in this study. For the operator questionnaire, the location distribution reported in Table 1 indicates that responses were obtained primarily from the Pingjiang, Shuangta, and Wumenqiao areas. The resident sample is dominated by long-term residents and includes a higher share of women. This profile suggests that the dataset captures especially the perspectives of established residents, and it may under represent groups that spend less time in neighborhood public spaces during survey periods. Accordingly, the survey results are used as case based evidence of perceived outcomes and stressors rather than as district-wide population estimates.

Most perception measures used five-point Likert-type items. For residents and operators, built-environment and cultural items were measured as satisfaction (1 = very unsatisfactory, 5 = very satisfactory). For several operator-focused items, perceived change was captured using a five-category “growth-rate” scale (significantly decreased, slightly decreased, no change, slightly increased, significantly increased), enabling trend-oriented assessment of transport convenience, customer flow, and economic benefits. To examine distributive stressors, the operator survey also measured perceived rent growth and psychological stress level as ordered categories.

In addition, semi-structured interviews were conducted with ten experts involved in Suzhou Ancient City development and management. Experts were purposively selected to capture knowledge across municipal and district planning, architectural design, heritage conservation practice, community governance, and project development and operation. To encourage candour and protect professional confidentiality, interviewees are anonymized as E1–E10. Interview guides focused on perceived development challenges (physical, socio-economic, cultural, and governance) and on implementable strategies for sustainable improvement, including the feasibility of specific policy tools.

In selecting experts, emphasis was placed on individuals who could speak across both conservation and development logics. Interviewees included senior academics in urban planning and design, project managers from renewal and cultural-investment entities, senior architects involved in heritage and adaptive reuse projects, and government or quasi-government officials responsible for historic district management. This diversity supports a more nuanced understanding of how ‘expert strategies’ are shaped by professional positioning and by the institutional arenas in which recommendations must be implemented.

3.3 Data analysis and quality assurance

Survey data were analyzed using descriptive statistics (frequencies and percentages). For relationships between categorical variables central to governance and distributive sustainability (e.g., participation vs. overall satisfaction; stress level vs. rent growth), cross-tabulations were produced and Pearson χ^2 tests were applied. Effect size is reported using Cramér’s V. Where structural zeros occurred in the original response categories (e.g., no respondents reporting rent

decreases), categories were consolidated to support interpretable association testing.

Interview transcripts and notes were coded thematically. Initial coding captured issue categories frequently cited in HUL and heritage-led regeneration literature (e.g., authenticity, displacement, infrastructure, participation). Focused coding then consolidated recurring concepts into higher-level themes such as ‘incremental acupuncture renewal,’ ‘nested governance,’ and ‘integration of living and culture.’ Triangulation across surveys, observations, and interviews was used as a quality assurance strategy: where themes emerged in interviews, corresponding evidence was sought in survey patterns and observed site conditions. This triangulation supports analytical credibility by reducing reliance on any single data source.

Qualitative coding was conducted iteratively using a shared coding schema developed from the interview guide and the literature-informed issue domains used in initial coding. Codes were refined through repeated reading of transcripts and field notes, and higher level themes were consolidated by comparing coded segments across interviewees and across the four case settings. To strengthen analytical auditability, the coding schema grouped recurring issues into interpretive themes including infrastructure constraints, mobility pressure, participation deficit, over-commercialization, living heritage continuity, and governance fragmentation, which together structure the expert strategy pathways reported in the Results section.

The research design acknowledges that heritage-led development is a politically and socially sensitive topic. Accordingly, the study reports aggregated survey findings and anonymized expert perspectives. The goal is not to attribute specific claims to named individuals or departments, but to generate actionable knowledge about the types of challenges and strategies that are likely to be relevant for sustainable improvement in Suzhou Ancient City.

A final aspect of quality assurance concerns interpretive balance. In heritage districts, different stakeholders may interpret the same outcome in opposing ways—for example, tourist influx may be seen as economic vitality by some businesses but as crowding and privacy loss by residents. The study therefore treats stakeholder perception differences as analytically meaningful, not as measurement error. This approach is consistent with value-based heritage management, which recognizes that heritage ‘values’ are plural and negotiated [1].

4. RESULTS

4.1 Stakeholder perceptions of renewal outcomes and stressors

Resident responses paint a mixed picture: strong cultural–social outcomes and generally positive public-order conditions sit alongside a pronounced deficit in mobility convenience. As shown in Table 2, residents reported high positive satisfaction with cultural identity (96.8% positive), entertainment activities (93.9%), perceived economic benefits (93.2%), and safety (86.9%). Transportation stands out as the key stressor, with 92.7% reporting negative satisfaction (very unsatisfactory or unsatisfactory), indicating that everyday access and movement have not kept pace with renewal and visitor growth.

Within the resident questionnaire, transportation is interpreted as overall everyday mobility convenience, including the ease of accessing the ancient city from surrounding districts and the ease of moving within local streets under conditions of visitor flow and traffic control. The exceptionally negative ratings therefore likely reflect a combination of constrained street widths, limited parking and pickup space, pedestrian congestion during peak tourism periods, and practical frictions for routine activities such as deliveries, waste collection, and emergency access. These constraints are consistent with on-site observations across the studied typologies, where narrow lanes and high visitor density concentrate mobility pressure even when streetscape upgrades improve visual quality.

Table 2. Resident satisfaction with key renewal outcomes (N = 412)

Indicator	Negative n (%)	Neutral n (%)	Positive n (%)
Greenery	35 (8.5%)	86 (20.9%)	291 (70.6%)
Transportation	382 (92.7%)	21 (5.1%)	9 (2.2%)
Basic infrastructure	126 (30.6%)	17 (4.1%)	269 (65.3%)
Entertainment activities	10 (2.4%)	15 (3.6%)	387 (93.9%)
Cultural landscapes	44 (10.6%)	212 (51.5%)	156 (37.9%)
Cleanliness	135 (32.8%)	42 (10.2%)	235 (57.0%)
Safety	7 (1.7%)	47 (11.4%)	358 (86.9%)
Sounds	128 (31.1%)	5 (1.2%)	279 (67.7%)
Cultural identity	11 (2.7%)	2 (0.5%)	399 (96.8%)
Perceived economic benefits	20 (4.9%)	8 (1.9%)	384 (93.2%)
Living behavior	71 (17.2%)	64 (15.5%)	277 (67.2%)

Note: Negative = very unsatisfactory + unsatisfactory; Neutral = moderate; Positive = satisfactory + very satisfactory.

Between these poles, several built-environment indicators sit in the middle range. Basic infrastructure received net-positive ratings (65.3% positive), but cleanliness (57.0% positive) and the overall sound environment (67.7% positive) still include sizeable negative segments (32.8% and 31.1%, respectively), consistent with localized externalities observed on site (informal vending, waste accumulation, and crowd-related noise). Cultural landscapes were the most “neutral” domain: 51.5% selected moderate, suggesting that heritage display and place-making improvements are visible yet not experienced uniformly as beneficial to everyday life.

Commercial operators expressed a similar blend of improvement and pressure (Table 3). Safety was rated very positively (96.3% positive satisfaction), and most operators perceived customer flow to have increased (84.1% reporting improvement). At the same time, a large majority reported worsening transport convenience (73.8% reporting a decrease), implying that visitor-oriented revitalization can intensify service and delivery burdens without commensurate mobility upgrades.

Economic benefits among operators were mixed: 52.3% reported improved economic benefits, while 39.3% reported no change (Table 3). Cost pressures, however, are unevenly

distributed. A cross-tabulation between psychological stress level and perceived rent growth shows a statistically significant association (Pearson $\chi^2(4, N = 107) = 11.46, p = 0.022$; Cramér's $V = 0.23$), with higher stress levels aligning with higher reported rent growth (Table 4). This pattern suggests that perceived sustainability in the ancient city is shaped not only by physical conditions but also by distributive dynamics that affect the viability of small operators and everyday services.

Taken as a whole, the stakeholder surveys point to visible improvement but uneven capacity: strong cultural and safety baselines coexist with mobility deficits, localized environmental externalities, and rent-related stressors. These conditions help explain why experts repeatedly emphasized integrated governance, incremental upgrading, and targeted distributive instruments.

Table 3. Commercial operator perceptions of change and satisfaction (N = 107)

Indicator	Negative/Worsened (%)	Neutral/No Change (%)	Positive/Improved (%)
Transportation condition (change)	73.8	15.0	11.2
Cleanliness	5.6	30.8	63.6
Safety	0.0	3.7	96.3
Perceived economic benefits (change)	8.4	39.3	52.3
Customer flow (change)	0.0	15.9	84.1

Note: For satisfaction items, negative = very unsatisfactory + unsatisfactory and positive = satisfactory + very satisfactory. For change items, negative = decreased and positive = increased.

Table 4. Stress level and rent growth among commercial operators (N = 107)

Stress Level	No Change	Slightly Increased	Significantly Increased	Total
Moderate	0 (0.0%)	6 (100.0%)	0 (0.0%)	6
High	3 (5.5%)	37 (67.3%)	15 (27.3%)	55
Very high	0 (0.0%)	23 (50.0%)	23 (50.0%)	46
Total	3	66	38	107

Note: Cells report count (row %), except the Total row. Pearson $\chi^2(4, N = 107) = 11.46, p = 0.022$; Cramér's $V = 0.23$. Categories with zero counts (rent decreases) are omitted to avoid structural zeros.

4.2 Participation and satisfaction: Evidence of a governance leverage point

Participation remains limited in the renewal process. Only 46 residents (11.2%) reported having participated in redevelopment activities or consultations, while 366 (88.8%) reported no participation. Table 5 cross-tabulates participation with overall satisfaction and indicates a pronounced gap: among participants, 93.5% reported being completely or somewhat satisfied, whereas among non-participants only 46.7% reported being completely or somewhat satisfied.

Table 5. Community participation and overall satisfaction (N = 412)

Overall Satisfaction	Participated (n = 46)	Not Participated (n = 366)
Completely satisfied	20 (43.5%)	8 (2.2%)
Somewhat satisfied	23 (50.0%)	163 (44.5%)
Somewhat dissatisfied	3 (6.5%)	168 (45.9%)
Completely dissatisfied	0 (0.0%)	27 (7.4%)

Note: Cells report count (column %). Pearson $\chi^2(3, N = 412) = 121.46, p < 0.001$; Cramér's $V = 0.54$.

Statistically, this gap is large (Pearson $\chi^2(3, N = 412) = 121.46, p < 0.001$; Cramér's $V = 0.54$) and points to participation as a practical leverage point: where residents can influence problem definition and implementation sequencing, renewal outcomes are more likely to be viewed as legitimate and aligned with daily-life needs. In heritage settings, participation also matters for living heritage and authenticity, because resident practices and routines constitute part of the

heritage value being managed [1, 18].

Although the participation and satisfaction association is strong, it should not be interpreted as evidence that participation alone causes higher satisfaction. The survey is cross-sectional, and participation is likely endogenous. Residents who are already more engaged, better informed, or more satisfied with renewal directions may be more willing to participate, while dissatisfied residents may disengage or avoid consultation processes. Participation should therefore be treated as a governance leverage point for legitimacy and alignment, but the causal direction and the role of confounding factors require longitudinal designs or multivariate modeling in future research.

4.3 Observed site conditions across redevelopment typologies

Field observations across the four cases illustrate how redevelopment typology influences the distribution of benefits and burdens. In the neighborhood market renewal case (Shuangta Market), public space was actively used by local residents for daily shopping and informal social interaction, reflecting the market's role as a living community infrastructure. The site exhibited strong day-to-day functionality and social permeability: residents, vendors, and visitors shared space without heavy theming. This pattern aligns with the proposition that everyday-use heritage spaces can sustain both cultural continuity and social cohesion when renewal emphasizes local needs [1, 18].

In contrast, the themed tourism street case (Shantang Haishi) displayed high visitor density, a strong emphasis on branded experiences, and a commercial mix oriented toward leisure consumption. Such environments can generate significant revenue and enhance visible vitality, but they also amplify externalities: noise peaks, waste accumulation, and

pedestrian congestion were more evident during high-flow periods. Observations also suggested potential boundary tensions between tourist activities and residential privacy, echoing findings from Pingjiang Road where residents negotiate publicity and boundary fluidity as tourism intensifies [10].

The commercial complex insertion (Huanyu Hui) and industrial-heritage creative campus (Sulun Factory regeneration) represented intermediate typologies. Both benefited from capital investment and curated spatial design, including upgraded interiors and event programming. However, both also demonstrated risks of functional homogenization, where retail and cultural offerings converge toward standardized formats that can be replicated across cities. From an HUL perspective, such homogenization undermines the uniqueness of place-based heritage values if renewal prioritizes generic consumption over local specificity [1].

Across all cases, a recurrent physical constraint was the limited capacity of historic streets and underground systems to accommodate growth in visitors, deliveries, and service demands. Narrow street profiles, protected canal edges, and fragmented parcels restrict options for traffic restructuring, drainage expansion, and utility renewal. These structural constraints help explain why stakeholders may express satisfaction with visible spatial upgrades while simultaneously reporting deficits in convenience, services, and long-term resilience.

4.4 Expert-identified challenges for sustainable development in Suzhou Ancient City

Expert interviews converged on a set of interlocking challenges for sustainable development in Suzhou Ancient City. Table 6 summarizes the challenges and the number of interviewees expressing each viewpoint (n = 9 respondents to this question), together with the strategy directions emphasized by experts.

Ten experts were interviewed in total; however, one interview did not include a response to the standardized challenge identification prompt used for the frequency summary, so Table 6 reports n = 9 for that specific question.

Experts also highlighted socio-cultural risks associated with commercialization and tourism intensification. Several

interviewees described a pattern of “over-commercialization,” in which visitor-oriented functions expand while residential and community-serving functions shrink. This was framed not only as an economic issue but as a cultural sustainability problem: as residents leave, the everyday practices that produce living heritage weaken, and the district risks becoming a “stage set” rather than a lived environment. This interpretation resonates with tourism and authenticity debates that emphasize staged and consumption-oriented heritage as a partial—and potentially fragile—representation of place [11, 19].

Governance constraints surfaced repeatedly as a barrier to sustainable improvement. Experts pointed to fragmented departmental responsibilities, weak coordination across planning, heritage, tourism, traffic, and community services, and performance incentives that privilege short-term visible outputs over long-run liveability and maintenance. Participation mechanisms, in particular, were often described as limited to information disclosure or consultation rather than deliberative co-design. This diagnosis echoes broader assessments of constrained participation in Chinese regeneration contexts [26, 32].

Demographic change and social structure were also treated as sustainability constraints. An aging resident population increases demand for accessible services and neighborhood-level healthcare, while youth outmigration and rising housing costs can weaken intergenerational continuity of local culture. If renewal is oriented primarily toward visitor consumption, everyday functions such as wet markets, schools, and affordable dining may decline, further reinforcing residential outmigration. Experts therefore framed sustainability as the ability to keep the ancient city livable for residents while accommodating compatible economic activity—rather than treating tourism growth as the primary performance indicator.

Experts further warned about identity dilution and spatial homogenization. They noted that themed commercial streets, if replicated with similar design language and tenant mixes, risk erasing the distinctiveness that historic cities are meant to protect. From an HUL standpoint, this reflects a misalignment between value-based heritage management and standardized consumption-led development. Sustaining Suzhou’s uniqueness, experts argued, requires deeper engagement with local histories, crafts, and neighborhood practices, not only the preservation of façade aesthetics.

Table 6. Expert-identified challenges and strategy directions (n = 9 interviewees)

Challenge	Experts Mentioning	Share of Experts	Strategy Direction(s)
Balancing Cultural Preservation and Modernization	4 / 9	44.4%	Integrating Heritage Protection with Modern Urban Needs
Insufficient Community Participation and the Outflow of Original Residents	5 / 9	55.6%	Enhancing Community Participation and Empowering Original Residents
Basic Infrastructure and Public Services	2 / 9	22.2%	Integrating Modern Infrastructure with Cultural Heritage Preservation
Commercialization and Sustainable Development of the Suzhou Ancient City	4 / 9	44.4%	Avoid Over-commercialization and Protect the Cultural Core; Promote Cultural Innovation and Diversified Development
Loss of Young Talent	1 / 9	11.1%	Creating Supportive Cultural and Living Environments to Retain Young Talent
Space and Resource Constraints	1 / 9	11.1%	Maximizing Spatial Efficiency while Preserving Cultural Heritage
Sustainability	1 / 9	11.1%	Promoting Sustainable Development through Continuous Cultural, Commercial, and Community Engagement

Note: “Experts mentioning” reflects the number of interviewees who articulated the challenge in responses to the same question; categories are not mutually exclusive.

4.5 Expert-driven strategies for sustainable improvement

Experts proposed strategy portfolios that combine incremental physical renewal with governance reforms and cultural activation. A central concept was ‘acupuncture-style’ regeneration: rather than relying on large-scale demolition or flagship commercial projects, experts recommended targeted, small-scale interventions that address critical deficits—drainage bottlenecks, barrier-free access points, pocket public spaces, and community facilities—while minimizing disruption to heritage fabric and resident life. This approach aligns with China’s broader shift toward micro-regeneration and incremental redevelopment as an alternative to wholesale redevelopment [9].

Several experts emphasized the importance of ‘nested’ or multi-level renewal frameworks, in which citywide strategic plans set conservation and development principles, while neighborhood-level projects adapt interventions to local conditions and stakeholder needs. Under this nested model, expert consultation becomes an ongoing governance mechanism rather than a one-time design review. Experts argued for institutionalizing cross-department coordination platforms, supported by expert panels and community representatives, to ensure that infrastructure, tourism management, and heritage protection are addressed in an integrated manner consistent with HUL principles [1].

In terms of cultural and social sustainability, experts prioritized strategies that integrate ‘living’ and ‘culture.’ This includes supporting resident-oriented functions such as wet markets, community dining, clinics, elder services, and local cultural events, alongside visitor-oriented programming. Experts argued that safeguarding authenticity requires maintaining a residential base and ensuring that intangible cultural practices are not reduced to performative spectacles. Such people-centered strategies reflect living heritage guidance that frames communities as heritage stewards and value carriers [18].

For economic and distributive balance, experts proposed instruments that internalize externalities and reduce displacement pressures. Suggested tools included differentiated rent and tax policies for traditional businesses, subsidies for community-serving functions, and the creation of dedicated heritage maintenance funds financed partly through tourism revenues. These strategies correspond with gentrification research emphasizing that public investment should be paired with protections to prevent displacement and to preserve social diversity [23]. Experts also noted that property rights complexity can impede implementation, suggesting that governance models addressing unclear ownership and responsibilities are necessary for effective reuse and maintenance [35].

Experts emphasized mobility and visitor management as sustainability levers. Rather than treating congestion as an unavoidable by-product of success, experts advocated for active demand management, including route diversification, time-based crowd guidance, and improved last-mile mobility that reduces conflicts between residents’ needs and tourist flows. Experts further noted that demand management can support heritage protection by reducing peak-period wear on pavements and historic structures, and by lowering the operational burden on sanitation and security teams.

Experts also brought climate resilience into the strategy

discussion. They highlighted the need to incorporate drainage improvement and sponge-city measures into renewal projects so that historic areas are not disproportionately affected by extreme rainfall and heat stress. Sponge-city approaches emphasize increased permeability, distributed storage, and green–blue infrastructure, and have been presented as a planning breakthrough for reducing urban flood risk in Chinese contexts [36]. For Suzhou Ancient City, experts argued that such measures must be adapted to heritage constraints through careful material selection, minimally invasive underground works, and small-scale interventions (e.g., permeable paving in courtyards and pocket parks) that preserve historic character.

5. DISCUSSION

5.1 Interpreting Suzhou’s challenges through HUL and heritage-led regeneration research

The findings reinforce a central insight of HUL: in historic city cores, sustainability is not a single-domain problem but an integration challenge. Survey patterns suggest that visible improvements and basic order can coexist with persistent deficits in participation and service convenience. This duality mirrors the implementation gap documented in HUL scholarship, where heritage-led development may adopt integrated rhetoric but remain uneven in practice due to institutional fragmentation and insufficient community influence [16, 17]. In Suzhou, the physical constraints of a dense water–street fabric intensify this gap because infrastructure upgrades and mobility management require cross-department coordination and long-term investment, not only surface-level urban design.

Suzhou’s case also aligns with Chinese and international research on tourismification and commercialization. Expert concern about over-commercialization echoes prior analyses of Suzhou’s historic streets as postmodern consumption spaces [11] and of resident–tourist tensions along Pingjiang Road [10]. The commercial operator stress associated with rent increases provides micro-level evidence consistent with broader displacement frameworks. While the present study does not measure displacement directly, the combination of rent pressure and stress signals a risk pathway through which traditional businesses may be replaced, contributing to functional homogenization and weakened living heritage. This resonates with tourism gentrification accounts in which visitor-oriented redevelopment changes local business ecosystems and erodes everyday affordability [21, 22].

An additional implication concerns how different redevelopment typologies shape sustainability outcomes. The market renewal case demonstrates that upgrading can strengthen social infrastructure when it sustains everyday functions and fosters inclusive public space. By contrast, themed tourism streets can generate high short-term revenue but may require stronger externality management tools to protect residential liveability. This typology-based differentiation suggests that policy should not apply a single model of ‘successful renewal’ to all historic areas; rather, governance instruments and evaluation criteria should be tailored to the dominant function and stakeholder mix of each sub-area within the ancient city.

5.2 Feasibility of expert strategies: Technical, institutional, and financial considerations

A key contribution of the expert interviews is the emphasis on implementability. The proposed ‘acupuncture-style’ renewal approach is technically feasible in Suzhou’s historic fabric because it reduces the need for large-scale demolition and allows infrastructure upgrades to be staged. Incremental interventions can focus on the most critical failure points—drainage hotspots, barrier-free routes, and neighborhood facilities—while respecting conservation constraints. Such staging is consistent with adaptive reuse and incremental renewal literature, which highlights that small-scale interventions can mitigate disruption and enable learning-by-doing [9, 33].

Institutional feasibility, however, depends on governance architecture. Experts’ call for nested, cross-department coordination responds directly to the fragmentation barrier. From a policy utilization standpoint, this can be interpreted as an attempt to move expert knowledge from symbolic legitimization toward instrumental use [15]. To succeed, coordination platforms must have decision authority, stable funding streams, and accountability mechanisms that extend beyond individual projects. Without such authority, expert panels functioning as advisory bodies whose recommendations remain optional or are selectively adopted.

Financial feasibility requires aligning funding models with long-term maintenance and distributive fairness. Heritage-led redevelopment often relies on commercial revenue and land-value uplift; yet in historic cores, value capture can accelerate rent increases that undermine local-serving functions. The expert proposal of dedicated maintenance funds financed partly through tourism revenues is therefore significant, as it links externality generation (visitor flows) to externality management (infrastructure and services). This approach is consistent with the argument that public investment should include mechanisms to protect vulnerable stakeholders and maintain social diversity [23]. In Suzhou, such funds could be paired with targeted subsidies for resident-serving amenities and traditional businesses, reducing the risk that renewal evolves into a purely visitor-oriented economy.

Property rights and regulatory feasibility represent an additional dimension of implementation risk. In historic cores, buildings often have complex ownership patterns and usage rights that complicate repairs, relocation, and adaptive reuse. Guo et al. [35] demonstrated how unclear property rights in Suzhou’s Pingjiang Historic Block can delay renewal and generate conflict. Expert strategies that assume smooth redevelopment processes may therefore underperform unless accompanied by governance mechanisms that clarify responsibilities, standardize negotiation procedures, and provide legal and financial support for conservation compliance.

5.3 Balancing stakeholder interests: Toward people-centered, expert-facilitated governance

Balancing stakeholder interests in Suzhou Ancient City involves at least four groups: long-term residents, commercial operators, visitors, and municipal/district authorities. These groups share an interest in a safe and attractive environment, but differ in priorities regarding affordability, access, and functional identity. Resident survey results indicating moderate participation satisfaction suggest that existing

mechanisms may not sufficiently empower residents to shape renewal choices. This condition reflects Arnstein’s [30] critique that consultation without decision influence can function as tokenism. From a sustainable heritage perspective, such tokenism is risky because it can erode stewardship and weaken the social foundations of living heritage.

Experts’ strategy of integrating residents’ everyday life with cultural activation provides a concrete pathway for balancing interests. Rather than separating ‘heritage display’ from ‘daily living,’ the strategy seeks to sustain a mixed-use environment where markets, community services, and cultural practices coexist with visitor experiences. This approach aligns with ICCROM’s people-centered heritage guidance [18] and with collaborative governance arguments that emphasize learning and trust-building across networks [31]. However, collaboration requires institutional design: community representatives need recognized roles, information must be accessible, and conflict-resolution mechanisms must be available when development pressures create trade-offs.

For commercial operators, the rent–stress association highlights the importance of economic instruments in stakeholder balancing. If renewal raises costs faster than revenues, small businesses may exit, and the commercial mix may shift toward capital-intensive chains and standardized formats. This outcome would undermine both local identity and the diversity that supports resilient urban economies. Therefore, balancing interests likely requires a differentiated policy regime in which local-serving, heritage-compatible businesses receive stronger protection and support than purely extractive or low-compatibility uses. Such differentiation is consistent with research emphasizing that heritage areas require governance tools that manage market dynamics rather than simply attracting investment [20, 21].

A further balancing challenge concerns the role of experts themselves. Experts may be positioned as neutral technical advisors, yet their knowledge and recommendations are embedded in institutional contexts and professional norms. Haas’s [28] epistemic community concept suggests that experts can consolidate a shared problem definition that guides policy, but it also implies that certain values may be privileged if expert communities are not diverse. To avoid technocratic bias, Suzhou’s governance architecture could formalize plural expertise, including social service professionals, community organizers, and small-business representatives, alongside planners and architects. Such pluralization would strengthen the capacity of expert consultation to bridge stakeholder interests rather than reinforce a single development narrative.

5.4 Operationalizing sustainability: Indicators, monitoring, and adaptive management

A recurring gap in HUL implementation is the difficulty of defining measurable indicators that connect heritage values to urban management decisions [16]. The present findings suggest that Suzhou could operationalize sustainable improvement through an indicator system organized around four domains: liveability, authenticity, resilience, and governance. Liveability indicators can include resident satisfaction with safety, noise, cleanliness, mobility, and service access—dimensions already partially captured in the present survey. Authenticity indicators can include the retention of residential population, the share of local-serving businesses, and the continuity of neighborhood cultural practices, reflecting living heritage principles [18].

Resilience indicators can track flood-risk exposure, drainage performance, permeable surface ratios, and maintenance response times, integrating sponge-city logic within heritage constraints [36]. Governance indicators can include participation reach (e.g., the proportion of households engaged in deliberation processes), transparency measures (e.g., public disclosure of renewal budgets and decision rationales), and the responsiveness of agencies to documented complaints. Such an indicator system would support adaptive management: projects could be adjusted when indicators reveal rising externalities or declining resident satisfaction, rather than relying on one-time post-completion evaluations.

In institutional terms, monitoring requires data stewardship and authority. Experts' suggestion of a dedicated ancient city coordination unit is therefore critical: without an entity responsible for collecting, interpreting, and acting upon indicator data, monitoring risks becoming a reporting exercise disconnected from decision-making. Embedding monitoring within a cross-department unit would also help align incentives away from short-term visual outputs toward long-term performance, consistent with the sustainability framing of both global urban agendas and HUL doctrine [1, 13].

5.5 Proposed sustainable heritage improvement model for Suzhou Ancient City

Based on the triangulated findings, the article proposes a “people-centered, expert-facilitated, incremental renewal” model as a context-appropriate sustainable heritage improvement pathway for Suzhou Ancient City. The model brings together four principles. It takes incremental renewal as the default implementation logic, prioritizing targeted interventions that address critical deficits without triggering large-scale displacement or loss of historic fabric. It also treats living heritage as a core conservation objective: maintaining resident presence and daily functions is understood as part of heritage value, not merely a social add-on [1, 18].

A further element is the institutionalization of expert consultation as governance infrastructure rather than as a project-by-project advisory process. In practice, this implies a permanent cross-department “ancient city sustainability unit” with an expert panel and community representation. The unit would oversee integrated planning, coordinate infrastructure works, evaluate proposals against sustainability indicators, and manage long-term maintenance funds. Such an arrangement operationalizes HUL integration by ensuring that heritage, mobility, sanitation, tourism, and community services are addressed within a shared decision framework [16, 17].

The model also embeds distributive instruments to manage commercialization and tourism externalities. These include a heritage maintenance and community services fund financed by tourism-related revenues; targeted subsidies and lease-support mechanisms for traditional businesses and community-serving functions; and adaptive reuse governance mechanisms that clarify responsibilities and reduce transaction costs where property rights are complex [35]. By embedding these instruments, the model seeks to prevent the “success trap” in which rising popularity accelerates rent increases and functional homogenization, weakening the very heritage values that attract visitors.

Operationally, implementation can be structured as a phased pathway. Short-term actions (1–2 years) focus on quick-win infrastructure and service upgrades at micro-scales—drainage

bottlenecks, barrier-free access, sanitation improvements, and community facilities—coupled with transparent participation pilots. Medium-term actions (3–5 years) institutionalize governance platforms, expand monitoring indicators, and implement economic instruments for business mix management. Long-term actions (5+ years) integrate climate resilience, including sponge-city measures, into district-wide infrastructure renewal and public-space strategies [36]. The phased pathway reflects an implementation-sensitive approach to evidence use, increasing the likelihood that expert strategies translate into sustained improvement rather than one-off projects [15].

5.6 Theoretical contributions

The findings extend HUL scholarship by illustrating that sustainability performance in a heritage city can be uneven. In Suzhou, strong ratings on symbolic and public-order dimensions (identity, safety, cultural activities) coexist with acute deficits in everyday systems (mobility convenience) and distributive conditions (rent stress). This pattern supports calls to treat heritage conservation as an integrated urban-management problem rather than a sectoral exercise [1, 16, 37].

Table 5 quantifies the participation–satisfaction relationship and shows that even limited participation is associated with markedly different legitimacy evaluations in a Chinese historic-core context. This result lends empirical support to classic and contemporary participation theory [30, 31, 38] and complements China-focused evidence that participation mechanisms may exist procedurally but remain weak unless institutional design makes them influential in heritage decision-making [14, 26].

Beyond participation, the analysis contributes to policy-knowledge and expert-governance literature by specifying how expert consultation can operate as durable governance infrastructure—an epistemic coordination device—rather than a one-off advisory input. In this model, experts function as boundary actors who translate heritage values, engineering constraints, and social-equity trade-offs into implementable packages [15, 28, 29, 39].

Operator data further underline how distributive pressures shape perceived sustainability. The rent–stress association (Table 4) suggests that heritage-led upgrading can create cost burdens that matter even when customer flows rise, aligning with tourism gentrification and displacement research in historic districts [21–23] and with Suzhou-specific accounts of tensions along tourism streets [10, 11].

5.7 Policy implications for Suzhou Municipal Government

For Suzhou Municipal Government, the results imply that sustainable improvement is less a single project choice than an institutional arrangement capable of coordinating heritage conservation, mobility, public services, and commercial management. Consistent with UNESCO's HUL Recommendation and the New Urban Agenda, a practical step would be a permanent ancient-city integrated-management unit (or an inter-departmental steering mechanism) with a clear mandate to align conservation with infrastructure and social policy, supported by routine monitoring of resident liveability and business-viability indicators [1, 13].

Mobility appears to be the binding constraint. The exceptionally negative transportation ratings among residents

point to the need for a coherent demand-management strategy that addresses car-parking supply, freight delivery, tourist coach access, and last-mile accessibility. In many historic cores, practical packages combine peripheral parking with timed shuttles, access-control windows for logistics, and pedestrian-first street design—implemented in ways that respect historic townscapes while preserving everyday resident access, as emphasized in ICOMOS principles [2, 3].

Participation mechanisms also need to move beyond occasional consultation toward repeatable co-governance routines. Given the strong association between participation and satisfaction, municipal and subdistrict actors could institutionalize neighborhood forums and co-design workshops at key milestones, coupled with feedback loops that document how resident input changes designs. The aim is not simply higher participation counts, but meaningful influence—consistent with participation ladders and collaborative planning theory [30, 31, 38] and with evidence on community participation in Chinese heritage management [14, 32].

To manage tourismification and commercialization externalities without undermining the local economy, Suzhou could combine business-mix management (protecting daily-life services), rent and lease monitoring, and targeted fiscal instruments (e.g., differentiated taxes, subsidies for essential services, or support for long-standing tenants). Such distributive tools reflect displacement research, which shows that market-led upgrading can push out both residents and locally embedded businesses when protective instruments are absent [21-23].

In practice, implementation can lean on micro-regeneration and adaptive reuse to minimize disruption and protect authenticity while improving performance. Small-scale, participatory micro-regeneration has been advanced in China as a way to reconcile heritage values with modern services [9], while adaptive reuse research emphasizes aligning technical upgrades with institutional and property-rights realities [33-35]. Given Suzhou's water-sensitive urban form, integrating resilience-oriented drainage and flood-risk measures—such as sponge-city approaches—can protect both heritage fabric and resident well-being [36].

6. CONCLUSION AND RECOMMENDATIONS

Suzhou Ancient City illustrates both the promise and the fragilities of heritage-led development in rapidly changing urban contexts. Across the surveys, observations, and expert interviews, renewal is widely seen to have strengthened public-order conditions and delivered visible spatial improvements. At the same time, sustainability risks remain concentrated in service convenience, limited participation, and the distributive effects of commercialization. Experts described a tightly coupled challenge set: fragile underground infrastructure and climate-related exposure; commercialization and homogenization that can erode living heritage; and fragmented governance that makes integrated problem-solving difficult.

The expert strategy portfolio emphasizes incremental “acupuncture” renewal, nested multi-scale governance, integration of daily life with cultural activation, and policy tools that internalize tourism and commercial externalities. Set against existing research, these strategies align closely with HUL doctrine and with Chinese micro-regeneration

approaches, while directly addressing persistent participation deficits and tourismification pressures. The proposed “people-centered, expert-facilitated, incremental renewal” model offers a coherent way to operationalize sustainable improvement as the integration of liveability, authenticity, resilience, and governance capacity.

Several policy steps follow from this model. Institutionally, a permanent cross-department coordination unit—supported by an embedded expert panel and channels for community representation—would help align infrastructure upgrades, tourism management, and conservation approvals. Physically, district-wide underground infrastructure renewal can be staged and paired with drainage and sponge-city measures to reduce waterlogging risks and protect both heritage fabric and everyday life. Financing can also be strengthened through a dedicated heritage maintenance and community-services fund that links tourism revenues to long-term upkeep and resident-serving improvements, thereby internalizing visitor-generated externalities. Finally, differentiated economic instruments (targeted subsidies, lease-support schemes, and business-mix guidance) can help retain traditional and community-serving businesses and reduce displacement pressures, and should be complemented by participatory governance that moves beyond information disclosure toward neighborhood-scale co-design with transparent feedback loops that show how public input shapes decisions.

In sequencing implementation, it is sensible to begin with pilot neighborhoods where resident organizations are active and where infrastructure deficits are well defined, so that tangible improvements can build trust in participatory processes. Pilots can pair at least one “hard” upgrade (e.g., drainage renewal or barrier-free access) with one “soft” governance improvement (e.g., community co-design workshops and published response reports). This combination is likely to generate visible value while demonstrating that participation is consequential. Over time, successful pilots can be formalized into standard procedures within the ancient-city coordination unit, reducing reliance on ad hoc project leadership.

This study has limitations. The survey captures perceptions at a point in time and cannot fully assess long-term displacement or demographic change trajectories. The commercial operator sample, while sufficient to identify salient patterns, may not represent all business types across the entire ancient city. Expert interviews provide rich strategic insight but reflect the perspectives of a limited group and may not capture all political constraints. Future research should adopt longitudinal designs that track resident and business retention over time, incorporate visitor-behavior data to evaluate crowd-management strategies, and test the proposed governance model through pilot implementation and performance indicators aligned with HUL principles. Comparative research across multiple Chinese historic city cores would further clarify which strategy components are context-specific to Suzhou and which are transferable.

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