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From Project Delivery to Conditional Landscape Stewardship: A Longitudinal Documentary Case Study of Peri-Urban Rural Regeneration in Hsinchu, Taiwan

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Abstract

Publicly funded rural-regeneration programs often deliver facilities, yet post-completion continuity depends on whether the outputs remain usable, active, and maintainable. This study examines Hsinchu City, Taiwan, through a five-year documentary trajectory (2020–2024) comprising five annual reports, one citywide achievement booklet, and four case evidence bundles. It asks how project delivery may support—or fail to support—everyday landscape stewardship. Using an abductive documentary case-study design and maximum-variation comparison of Haishan, Gangbei, Qiedong, and Xiangcun, the analysis develops conditional landscape stewardship around three interdependent conditions: material–spatial usability, functional continuity, and social-organizational maintenance. It identifies four indicative interruption modes: completed but underused space, event-dependent activation, responsibility and resource gaps, and livelihood value disconnected from shared maintenance. The weakest-link heuristic treats a pronounced weakness as a review trigger rather than proof of project failure. The study contributes a document-supported diagnostic framework and a proposed *ex ante*/*ex post* governance checklist. It identifies governance conditions and vulnerabilities; it does not directly measure long-term use, environmental performance, or sustainability outcomes.

Keywords: sustainable urban–rural development; rural regeneration; peri-urban governance; place-keeping; landscape stewardship; maintenance capacity; documentary case study



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1. Introduction

1.1. The Sustainability Problem After Project Completion

Rural regeneration is commonly justified through community participation, environmental improvement, cultural continuity, local livelihood support, and public-space upgrading. These goals are central to sustainable rural development, but they are not secured by project completion alone. Recent studies of community-led landscape regeneration, rural spatial governance, integrated public-space management, and rural public-space sustainability similarly emphasize that durable benefits depend on post-delivery organization, use, maintenance, and institutional coordination [1–5]. The unresolved question is therefore not simply what a project builds but how a time-limited intervention becomes an ordinary, supportable practice after funding and construction end.

The problem is particularly acute in peri-urban settings. Rural communities near cities experience development pressure, fragmented land-use regimes, changing livelihoods, ecological exposure, and close interaction between agricultural, residential, recreational, and infrastructural functions. Studies of peri-urban rural governance show that facilitation, collaborative networks, and adaptive capacity are necessary because urban and rural actors, administrative units, and landscape systems rarely coincide neatly [6,7]. In Taiwan, urban sprawl and land-use uncertainty further complicate the continuity of rural landscapes and community-based management [8].

Hsinchu City provides a revealing setting for this question. It is a compact and highly urbanized municipality shaped by high-technology development, coastal wetlands, hillside settlements, agricultural-related land within urban-planning areas, and rural communities distributed across short urban–rural distances. Since the local expansion of rural-regeneration guidance, public investment and community proposals have produced a growing portfolio of public spaces, ecological learning sites, heritage reuse, and livelihood-oriented facilities. The unresolved question is whether these outputs can be converted into durable stewardship rather than remaining short-lived policy displays.

1.2. Research Gap and Contribution

Existing studies explain rural regeneration through policy transition, community empowerment, territorial governance, resilience, and community capitals. Research in Taiwan further shows that community empowerment, rural regeneration, and regional revitalization overlap but are not institutionally identical [8–10]. Recent international research adds evidence on community-led regeneration, development-rights-oriented spatial governance, integrated public-space management, and self-organized rural public spaces [1–5]. Together, this literature clarifies many attributes of sustainable rural transformation, but it leaves the project-to-post-delivery conversion process insufficiently isolated as an analytical problem.

Existing place-keeping and stewardship approaches identify long-term management tasks, actors, motivations, capacities, relationships, and adaptive context [11–15]. Adaptive-governance and community-resilience approaches explain learning, flexibility, and reorganization under change [16–20]. Their insights are indispensable, but they do not usually treat project delivery and post-delivery stewardship as analytically distinct stages connected by a traceable conversion process. This study therefore asks where that conversion appears supportable, incomplete, or vulnerable, rather than proposing another general inventory of sustainability attributes. Table 1 summarizes the distinction.

Table 1. Comparison of related governance approaches and the added focus of conditional landscape stewardship.

Approach	Primary Focus	What It Clarifies	Remaining Gap/Added Value for Post-Delivery Conversion
Place-keeping [3,11,12]	Long-term management of public space	Management, finance, partnerships, maintenance, monitoring	Does not necessarily isolate the transition from time-limited project delivery to routine operation.
Environmental and relational stewardship [1,13–15]	Actors, capacities, motivations, relationships, and social–ecological context	Who cares for landscapes, why, and under what enabling conditions	Broad stewardship attributes are not always organized as a traceable post-project conversion diagnosis.

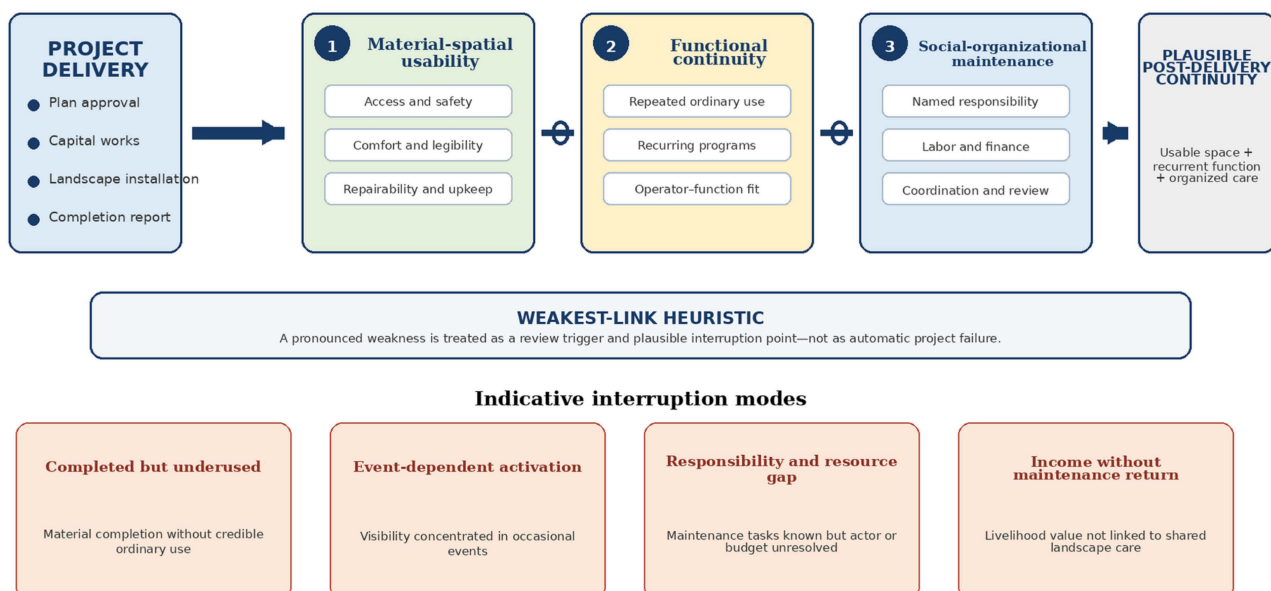
Table 1. Cont.

Approach	Primary Focus	What It Clarifies	Remaining Gap/Added Value for Post-Delivery Conversion
Adaptive governance and community resilience [2,16–20]	Learning, adaptation, collective capacity, and reorganization under change	How systems and actors respond to uncertainty and disturbance	Does not by itself specify which post-delivery condition should trigger project review or correction.
Conditional landscape stewardship (this study)	Conversion from funded output to plausible post-delivery continuity	Three interdependent conditions, four interruption modes, and a weakest-link review heuristic	Adds an evidence-bounded diagnosis linking project gates to post-delivery vulnerabilities without claiming measured outcomes.

Note: The comparison identifies analytical emphasis rather than mutually exclusive schools of thought. Conditional landscape stewardship builds on, rather than replaces, place-keeping, stewardship, adaptive governance, and community-resilience research.

This article addresses the gap by developing conditional landscape stewardship (Figure 1). The concept focuses specifically on the transition from funded output to plausible post-delivery continuity. It defines three complementary and non-substitutable conditions: material–spatial usability, functional continuity, and social-organizational maintenance. These conditions were refined iteratively through dialogue between the literature and documentary evidence rather than imposed as fixed a priori categories. Four interruption modes translate recurring documentary vulnerabilities into a bounded diagnostic vocabulary, while the weakest-link heuristic identifies where review or corrective attention may be warranted without asserting deterministic failure.

Conceptual framework—not a validated causal or performance model



Analytical use: locate vulnerable conversion conditions, narrow claims to documentary support, and guide targeted ex ante or ex post review.

Figure 1. Conditional landscape stewardship: diagnostic conversion framework. This conceptual figure distinguishes project delivery, three interdependent conversion conditions, a weakest-link review heuristic, and four indicative interruption modes. It is not a validated causal model or a quantitative performance instrument. Numbers 1–3 denote the three conversion conditions; arrows indicate the transition sequence, and plus signs indicate complementarity rather than numerical addition.

1.3. Research Questions

The study asks three questions. First, how did Hsinchu City's rural-regeneration platform change between 2020 and 2024, and what does the documentary trajectory reveal beyond participation and approval counts? Second, which conversion conditions and interruption modes are identifiable across distinct rural-regeneration project types? Third, how can documentary evidence inform project appraisal and post-completion monitoring without treating unmeasured environmental or social outcomes as demonstrated sustainability?

2. Literature Review and Analytical Framework

2.1. Sustainable Rural Development in Peri-Urban Contexts

Sustainable rural development in peri-urban regions cannot be reduced to agricultural production or village beautification. It involves coordination among land, livelihoods, ecological systems, public services, community organization, and urban–rural linkages. Recent work shows that rural revitalization and public-space sustainability are shaped by development rights, community engagement, integrated management, self-organization, and the fit between spatial provision and recurrent use [1–5]. Peri-urban settings intensify these issues because functional landscapes often cross administrative, sectoral, and property boundaries.

The rural-policy transition in Taiwan has expanded from production and infrastructure toward integrated production–living–ecology functions, local revitalization, and community participation. In Hsinchu, the relevant institutional and policy configuration includes land-use eligibility in urban-planning and non-urban areas, annual municipal guidance and funding cycles, the Bacon/Pei-Gen capacity-building sequence, Rural Regeneration Plan review and correction, and interfaces with ecological, cultural, livelihood, and public-space programs [8–10,21–27]. These components operate on different calendars and through different authorities. A community may therefore complete a funded output while responsibility for recurrent use, repair, or cross-boundary coordination remains unsettled.

Sustainable rural landscapes also depend on participation that is practically supportable. Participation can strengthen legitimacy, local knowledge, and collective ownership, but it cannot substitute for technical expertise, stable funding, safe design, or clearly assigned responsibility. Research on sustainable rural landscapes, community capacities, rural-regeneration participation, and collaborative infrastructures reinforces this corrective to participation-centric policy discourse [1,16–20,28,29]. The discussion returns to this distinction when considering administrative review and stewardship finance.

2.2. From Place-Making to Place-Keeping and Stewardship

Place-making focuses on creating or reinterpreting meaningful places. Place-keeping asks what happens after creation: who manages a site, how maintenance is financed, how quality is monitored, and how users remain involved [11,12]. Recent research on integrated public-space management further shows that sectoral fragmentation can separate design, maintenance, finance, and use even within well-resourced municipalities [3]. These insights provide the immediate foundation for examining post-project continuity.

Landscape stewardship adds a social–ecological dimension. Environmental and relational stewardship frameworks distinguish actors, motivations, capacities, actions, institutional context, and outcomes [13–15]. Community-led landscape-regeneration research similarly emphasizes long-term engagement, local leadership, and enabling relationships [1]. These approaches explain stewardship broadly; the present framework narrows attention to the conversion interface created when a time-limited public project is expected to persist as everyday care.

For rural-regeneration policy, this literature establishes what stewardship involves but does not fully specify how an approved and completed output crosses into routine practice. Project outputs are only potential assets. Their continued public value depends on a usable setting, a recurrent function, and an organized capacity to maintain both. Conditional landscape stewardship therefore adds a temporal and diagnostic question: which conversion condition is documented, which remains partial, and which unresolved vulnerability should trigger review?

2.3. Community Capacity and Relational Infrastructure

Community-capital research defines rural sustainability as a configuration of natural, cultural, human, social, political, economic, and built capacities rather than a single indicator [16]. Recent empirical work shows that individual capitals can relate unevenly to rural renewal, while participation in rural-regeneration programs does not guarantee uniform outcomes across development dimensions [17,29]. These insights justify treating maintenance capacity as a distinct analytical object rather than assuming that it follows automatically from participation.

Capacity must also be organized. The Organization–Capacity–Role framework identifies how local organizations, capability building, and role allocation support preventive action before deterioration becomes irreversible [18]. Co-design scholarship adds the idea of relational infrastructuring: meetings, maps, prototypes, events, and shared spaces can become durable supports for collaboration when they create relationships and routines that persist beyond a single intervention [19]. In coastal and fishing-village contexts, social capital and community empowerment are likewise connected to shared resource management, but only when participation is supported by guidance and incentives [20].

For the present study, maintenance capacity includes labor, technical knowledge, funding, role clarity, storage and tools, activity programming, repair routines, and the ability to revise arrangements when use conditions change. Public-benefit feedback is included because livelihood or tourism activities contribute to stewardship only when some value returns to shared spaces, community funds, or maintenance work. Without such feedback, commercial activation may coexist with deteriorating public assets.

2.4. Conditional Landscape Stewardship

Figure 1 summarizes the conceptual framework. Project outputs are treated as inputs rather than sustainability outcomes. Material–spatial usability concerns access, safety, comfort, legibility, repairability, and routine upkeep. Functional continuity concerns repeated ordinary use, recurrent programming, and fit between the site and its operator. Social-organizational maintenance concerns named responsibility, labor, finance, technical capacity, coordination, and review. The three conditions are analytically distinct but practically interdependent; a pronounced weakness is treated as a review trigger and a plausible interruption point, not as automatic project failure.

Three analytical expectations follow. First, the conversion conditions are complementary rather than substitutable. Second, event visibility is an unreliable proxy for functional continuity. Third, public-benefit feedback and boundary coordination mediate whether local activity can support shared maintenance. These expectations organize the cross-case comparison; they are diagnostic propositions rather than causal hypotheses tested with outcome data.

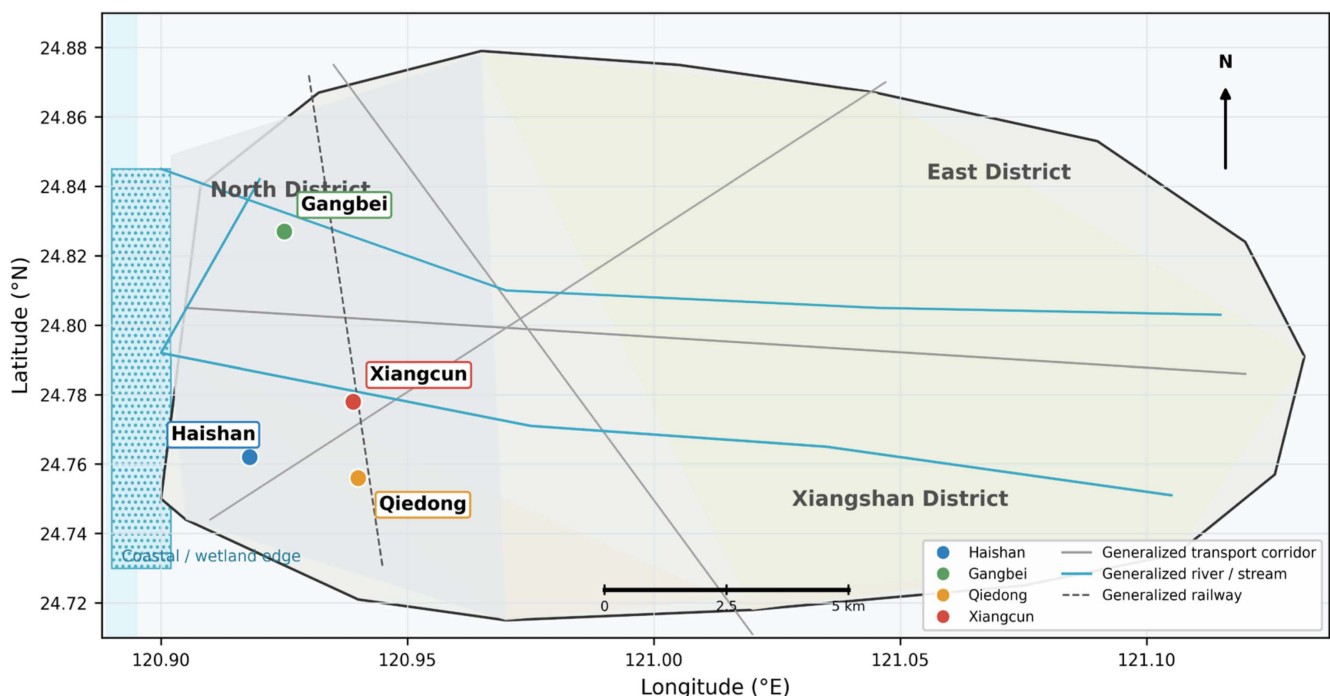
The framework identifies four indicative interruption modes. “Completed but under-used” refers to material completion without credible evidence of ordinary use. “Event-dependent activation” refers to visibility concentrated in occasional events rather than recurrent functions. “Responsibility and resource gap” identifies maintenance tasks for

which the actor, budget, or coordination routine remains unresolved. “Income without maintenance return” identifies livelihood value that is not demonstrably linked to shared landscape care. These modes are analytical vulnerabilities, not verified outcomes unless follow-up records directly support that conclusion.

3. Materials and Methods

3.1. Study Area and Temporal Scope

The study area is Hsinchu City, Taiwan, with particular attention to Xiangshan District and the adjacent Gangbei Community in North District. Figure 2 presents only the local municipal and district-scale context needed to locate the four focal cases; it does not display national or international boundaries. Community activity-center locations were geocoded from official public records [30–33]. The geographic and administrative terminology is used solely for study-area identification and legal-policy description. The analysis distinguishes the statutory framework, municipal implementation, and community-level practice.



Local-only study-area orientation; no national or international boundaries are displayed.

Figure 2. Coordinate-verified locations of the four focal communities within Hsinchu City. The substantially revised figure presents only the municipal and district-level study context required for local orientation; the former island-level locator and all national or international boundary representations have been removed. Community activity-center locations were geocoded from official public records [30–33]. WGS 84 coordinates, orientation, scale information, district labels, and generalized contextual corridors are shown. Community markers are locational references and do not represent legal community boundaries or cadastral parcels. Source: Authors’ own elaboration based on publicly available official community-point address records [30–33]. No third-party figure, map image, or copyrighted basemap was reproduced or adapted.

The local rural-regeneration scope includes communities in non-urban land-use areas and agricultural-related land within urban-planning areas where activation procedures are required. This creates a peri-urban governance setting in which eligibility, urban planning, ecological continuity, and community capacity must be negotiated together. The revised local-only map uses WGS 84 reference coordinates, a north arrow, scale information, verified point locations, district labels, and generalized contextual layers. District labels are

provided only for orientation; no national or international boundaries are displayed, and the figure is not a legal-boundary, cadastral, or parcel-level land-use map.

The observation window is 2020–2024. The Rural Regeneration Act implemented in Taiwan predates this window, and earlier local training initiatives shaped the baseline. The five-year sequence is sufficient to reconstruct changes in policy language, participation, review, correction, and documented maintenance concerns; it is not sufficient to verify stewardship persistence beyond 2024. The study therefore describes a medium-term documentary trajectory rather than proven long-term institutional transformation.

3.2. Documentary Corpus and Case Selection

The study adopts a longitudinal documentary case-study design. The final corpus was organized into 18 analytical source units: five annual municipal reports, one citywide achievement booklet, and twelve case-level source bundles (proposal/design materials, review/correction materials, and annual-report or achievement entries for each of the four cases). A source bundle may contain more than one closely related record and is reported as an analytical unit to avoid inflating document counts. Table 2 summarizes the municipal sequence, while Supplementary Table S3 reports source type, date, the issuing or holding body, analytical use, and completeness by level and case. The unit of analysis is the project-to-stewardship conversion process represented in these materials, not overall community performance [34–36].

Table 2. Municipal-level documentary sequence and analytical use in the 2020–2024 reconstruction.

Period	Documentary Source	Analytical Use
2020	Annual final report (ROC year 109)	Baseline scope; 36 eligible communities; 16 Bacon Plan communities; three approved Rural Regeneration Plans.
2021	Annual rural-regeneration reports (ROC year 110)	Early expansion; 20 trained communities; five approved plans; thematic zoning and annual guidance.
2022	Final report and project materials (ROC year 111)	Stable participation scale; 20 trained communities; six approved plans; cross-sector activation and exhibitions.
2023	Project-management final report (ROC year 112)	20 trained or activated organizations; seven approved plans; review workflow and regional issue cultivation.
2024	Final report and achievement booklet (ROC year 113)	Seven-plan baseline retained; project corrections, future planning, community actions, and maintenance-oriented reflection.
2020–2024	Community proposals, review records, policy texts, and analytical tables	Cross-case comparison of usability, functional continuity, maintenance capacity, public-benefit feedback, and interruption risk.

Note: ROC denotes the calendar used in the source documents; ROC year 109 corresponds to Gregorian year 2020. The Bacon/Pei-Gen Program is the staged rural-regeneration capacity-building sequence implemented before formal plan approval.

Four communities were selected through purposive maximum-variation sampling: Haishan, Gangbei, Qiedong, and Xiangcun. Selection required (1) a traceable documentary chain; (2) a distinctive intervention mechanism; (3) relevance to peri-urban transformation; and (4) sufficient evidence to identify a maintenance or continuity condition. All four were community-scale interventions examined within the same municipal guidance architecture, but they differed in output type and maintenance demand. They are analytical contrasts, not statistically matched cases or mutually exclusive “types.”

Comparable total investment figures were not consistently reported across the four documentary bundles. Public funding scale and construction cost were therefore not used as matching variables, and the study does not estimate comparative treatment effects. The available records indicate community-scale rather than major-infrastructure interventions,

but differences in intervention intensity, technical complexity, and recurring-cost exposure may still affect maintenance burden. Supplementary Table S2 reports relative intervention form and maintenance demand, and this unmatched resource dimension is treated as a primary limitation of cross-case inference.

3.3. Coding Procedure

The analysis followed an abductive and iterative logic. Place-keeping, stewardship, community-capital, and governance-capacity literature supplied sensitizing concepts before coding, but the three conversion conditions and four interruption modes were refined through repeated comparison with documentary evidence, negative cases, and contradictory records. The workflow comprised document inventory, chronological reconstruction, case selection, first-cycle coding, cross-case diagnosis, and evidence-boundary review. Table 3 links evidence to the framework. Supplementary Tables S1 and S4 provide worked examples and explicit decision rules.

Table 3. Coding matrix linking documentary evidence to the conditional stewardship framework.

Coding Dimension	Indicative Evidence	Analytical Question
Land-use and boundary context	Administrative location; eligibility; coastal, hillside, or urban-fringe relation	Is the intervention an isolated site or part of a wider functional landscape?
Material-spatial usability	Access; shade; resting; safety; water edge; storage; tools; repairability	Can the physical setting support repeated use and routine care?
Functional continuity	Courses; care activities; environmental learning; exhibitions; workshops; livelihood uses	Does the site have functions that can recur beyond project events?
Social-organizational maintenance	Labor; funding; responsibility; skills; inspection; repair; coordination	Who maintains the site, with what resources, and through which routine?
Public-benefit feedback	Community funds; shared maintenance; reinvestment; volunteer support	Does activity value return to common landscape care?
Evidence boundary	Documented fact; author interpretation; unmeasured outcome	How strong a claim can the available evidence support?
Qualitative evidence-status category	Documented provision; partial or uncertain continuity; unresolved vulnerability/evidence gap	What can be stated without converting qualitative evidence into a performance score?

Coding was conducted by the first author as a reflexive single-coder documentary analysis; no inter-coder reliability statistic is claimed. The second author did not independently recode the entire corpus. He reviewed the codebook, all case-level diagnostic summaries, the evidence-status assignments used in the cross-case diagnostic synthesis, and purposive source-to-claim chains covering every case and analytical condition. Disagreements were checked against the documentary record; when consensus could not be reached, the claim was narrowed and the more conservative evidence status was retained. This procedure strengthened analytical challenge without simulating independent double coding.

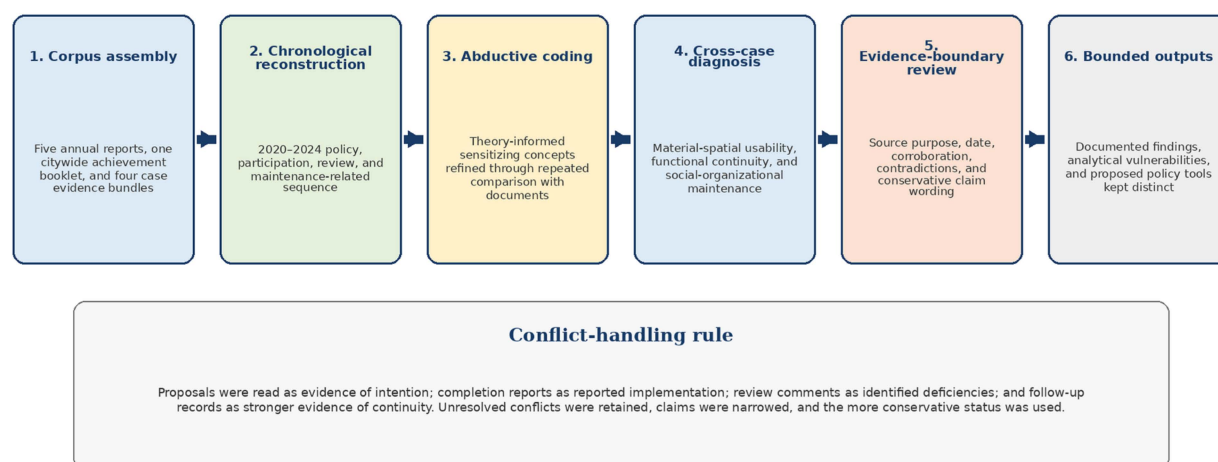
Incomplete, duplicated, and contradictory records were handled explicitly. Duplicated passages were consolidated rather than counted as corroboration. Proposals were read primarily as evidence of intention; completion reports as reported implementation; review comments as identified deficiencies or unresolved requirements; and follow-up records as stronger evidence of post-delivery continuity when available. Conflicting accounts were retained and compared by date, purpose, proximity to implementation, and corroboration. Unresolved conflicts were coded as contested or partial, the claim was narrowed, and the more conservative status was used. Supplementary Table S5 illustrates these source-purpose rules.

Evidence-status movement was operationalized as a staged qualitative rule rather than a numerical threshold. A condition remained partial or uncertain when a relevant provision or activity was documented but continuity was intermittent, externally dependent, recently initiated, unevenly implemented, or unsupported by comparable follow-up records. It was classified as an unresolved vulnerability when at least one of three circumstances applied: (1) a core requirement—such as a named responsible actor, recurrent-use arrangement, maintenance resource, repair protocol, safety response, or public-benefit feedback mechanism—remained absent at the relevant project stage; (2) two or more independent documentary source types consistently identified the same unresolved continuity problem; or (3) one high-consequence issue concerned safety, legal responsibility, essential maintenance, or loss of the project's core function.

Intervention was proportionate to the evidence. An information gap triggered a targeted request for follow-up documentation; a recurrent or cross-source vulnerability triggered a corrective action plan and scheduled review; and a high-consequence safety or legal issue triggered immediate administrative review. A vulnerability was treated as provisionally resolved only when a subsequent implementation or follow-up record documented closure, assigned responsibility, applicable resources, and a monitoring arrangement. These triggers identify the need for review and do not constitute automatic project failure or a standardized performance score.

3.4. Evidence-to-Argument Procedure

Figure 3 makes the inference procedure explicit. The study moved from corpus assembly and chronology to abductive coding, cross-case diagnosis, conflict handling, and bounded outputs. Documentary findings, analytical vulnerabilities, and policy proposals were kept distinct throughout the process.



The second author reviewed the codebook, all case summaries, cross-case diagnostic classifications, and purposive source-to-claim chains; unresolved disagreements were reported conservatively.

Figure 3. Documentary evidence-to-argument workflow. The methodological figure shows corpus assembly, chronological reconstruction, abductive coding, cross-case diagnosis, evidence-boundary review, conflict handling, second-author analytical review, and bounded outputs. Numbers 1–6 denote the workflow stages, and arrows indicate the analytical progression.

3.5. Visual-Analytical Strategy

The figures perform distinct analytical tasks. Figure 1 is a conceptual framework; Figure 2 is a local-only coordinate-verified study-area map; Figure 3 is a methodological workflow; Figure 4 is a document-derived interpretive trajectory; and Figure 5 is a qualitative diagnostic synthesis with local study-area orientation. Figure 4 condenses the annual

pattern, whereas Table 4 retains the coded year-by-year evidence and interpretive cautions. Figure 5 summarizes case differences, whereas Table 5 retains the case-level requirements and evidence basis. The paired formats were retained because merging them would either overload the visual figures with source-level detail or remove the audit trail required for qualitative interpretation.

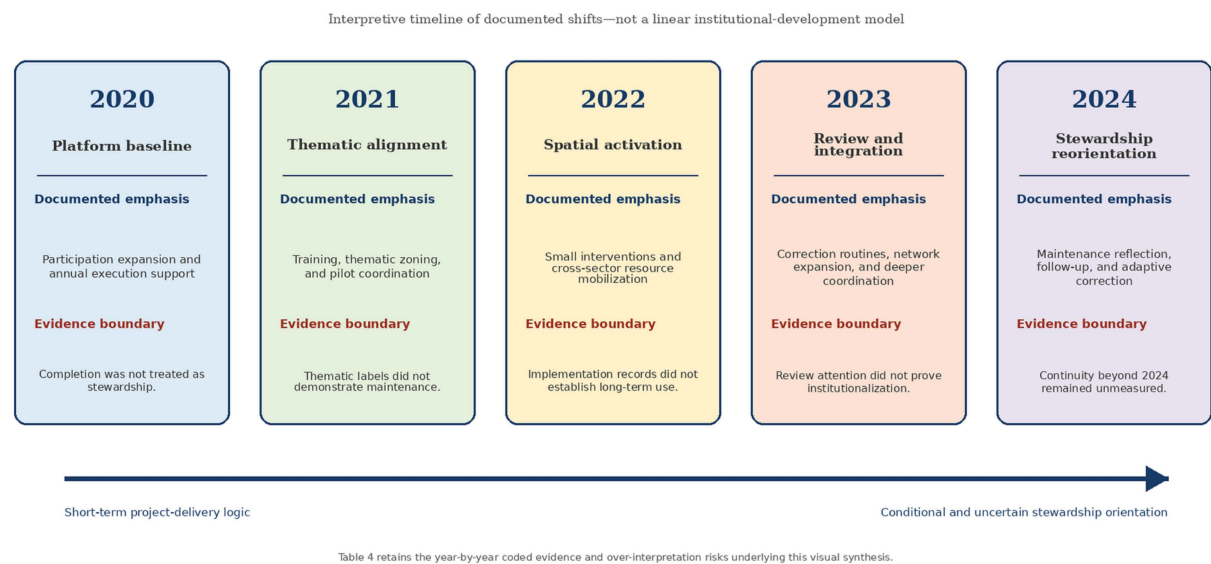


Figure 4. Document-derived governance trajectory, 2020–2024. The figure summarizes changes in documented emphasis and the principal interpretive caution for each year; it is an interpretive trajectory rather than a measured institutional-development scale.

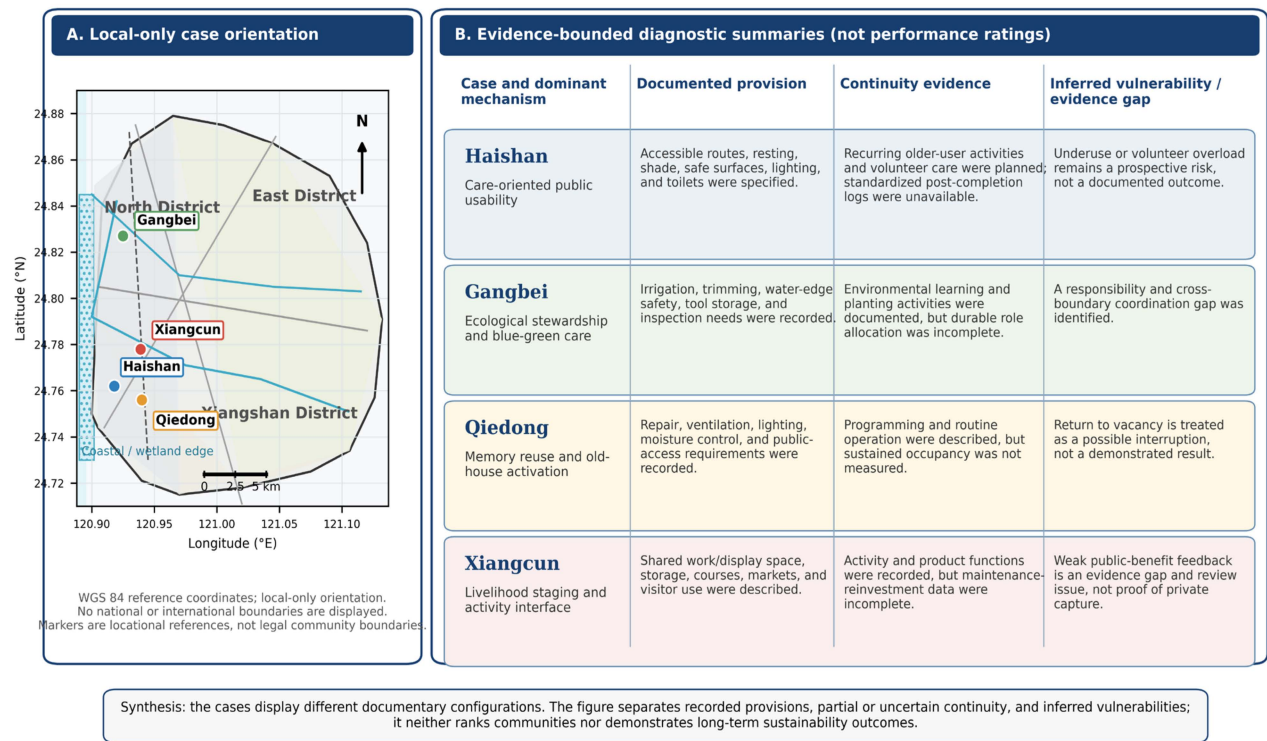


Figure 5. Cross-case diagnostic synthesis with local study-area context. (A) provides a local-only orientation map of the four focal cases; no national or international boundaries are displayed. (B) separates recorded provisions, partial or uncertain continuity, and inferred vulnerabilities. The figure is a qualitative, non-ranked synthesis. Background colors are used only to distinguish cases visually and do not encode performance levels or rankings.

Table 4. Year-by-year coded governance focus and risks of over-interpretation underlying Figure 4.

Year	Documented Phase	Governance Emphasis	Interpretive Caution
2020	Platform baseline	Participation expansion, project management, and annual execution support	Project completion should not be treated as governance success.
2021	Expansion and thematic zoning	Coastal, hillside, settlement, and ecological themes; community training	Thematic branding does not establish maintenance routines.
2022	Cross-sector activation	Co-creation, exhibitions, wetland collaboration, and regional visibility	Event visibility may not continue in everyday practice.
2023	Temporary stabilization	20 trained/activated organizations; seven approved plans; review routines	Stabilization within the window is not evidence of permanent institutionalization.
2024	Maintenance-oriented correction	Seven-plan baseline; proposal correction; future planning; maintenance reflection	Responsibility, evidence, and post-construction continuity remained uneven.

Table 5. Cross-case requirements and evidence-bounded interruption vulnerabilities.

Case	Documented Provision	Continuity Evidence	Inferred Vulnerability/Evidence Gap
Haishan	Accessible routes, rest, shade, safe surfaces, lighting, toilets, and maintainable planting were specified.	Care, exercise, and social activities were planned or reported; standardized post-completion logs were unavailable.	Underuse or volunteer overload remains a prospective risk; neither was measured.
Gangbei	Irrigation, trimming, water-edge safety, tool storage, inspection, and ecological-learning provisions were recorded.	Environmental learning and planting were reported, but durable responsibility and cross-boundary coordination were incomplete.	A responsibility and coordination vulnerability was documented; maintenance failure was not.
Qiedong	Repair, ventilation, moisture control, lighting, display, and public-access requirements were recorded.	Exhibitions, courses, and routine operation were described, but sustained occupancy was not measured.	Return to vacancy is a possible interruption, not a documented result.
Xiangcun	Shared work/display space, storage, courses, markets, product activity, and visitor use were described.	Activity and product functions were recorded, but maintenance-reinvestment data were incomplete.	Public-benefit feedback remains an evidence gap; private capture was not demonstrated.

Note: Recorded provisions and review issues are documentary findings. Statements about underuse, overload, vacancy, maintenance failure, or weak reinvestment are reported only as inferred vulnerabilities or evidence gaps unless direct follow-up evidence is available.

3.6. Use of Generative AI-Assisted Tools

Generative AI-assisted tools were used during manuscript revision for language refinement, structural editing, and preliminary visual-layout exploration. The principal tool used for the final revision and proofreading was ChatGPT (GPT-5.6 Thinking; OpenAI; accessed July–August 2026). They were not used to select cases, generate or code the documentary corpus, assign evidence-status markers, conduct the cross-case analysis, or determine the findings. The final locator figures were rebuilt from community locations geocoded from official public records [30–33] and from explicitly generalized contextual layers. All figure concepts, labels, coordinates, citations, analytical categories, interpretations, and final wording were reviewed and verified by the authors.

3.7. Reflexivity, Ethics, and Evidence Boundaries

The first author participated in rural-regeneration guidance and community empowerment work in Hsinchu City. This position supplied institutional context but created a risk

of self-confirming interpretation. Practitioner knowledge was used to clarify terminology, locate possible counter-evidence, and identify relevant records; it was not used as substitute evidence. The audit trail, conflict-handling rule, second-author review, and conservative claim wording were designed to discipline this positionality.

The documentary design can identify project rationales, recorded provisions, review corrections, planned functions, assigned or unresolved responsibilities, and evidence gaps. It cannot directly establish long-term usage, volunteer workload, environmental performance, resident satisfaction, or stewardship persistence. Findings are therefore reported as documented conditions, partial continuity evidence, or inferred vulnerabilities rather than as verified sustainability outcomes.

4. Results

4.1. Longitudinal Governance Trajectory, 2020–2024

The documentary sequence records early numerical expansion followed by temporary stabilization and a shift in documentary attention. In 2020, approximately 36 communities were within the local guidance scope, 16 had participated in the Bacon/Pei-Gen Program, and three had approved Rural Regeneration Plans. By 2021, participation had risen to 20 trained communities and five approved plans. The 2022 report retained 20 trained communities and recorded six approved plans; the 2023 report recorded 20 trained or activated organizations and seven approved plans. The 2024 materials retained the seven-plan baseline [22–26].

These figures do not support uninterrupted expansion or proven institutionalization. Later documents devoted more attention to thematic framing, cross-sector activities, review procedures, project correction, and maintenance-related reflection. The evidence therefore supports a change in documentary and administrative emphasis within the 2020–2024 window, not a claim that governance quality or long-term sustainability improved citywide.

Figure 4 condenses the five-year sequence into a document-derived trajectory from short-term delivery logic toward more explicit stewardship concerns. Table 4 preserves the annual evidence and cautions that prevent the visual synthesis from being read as a linear institutional-development model.

4.2. Material–Spatial Usability

The first conversion condition concerns whether recorded physical provisions could support repeated use and care.

Haishan’s proposal and review materials specified accessible routes, resting opportunities, shade, visible and safe circulation, non-slip surfaces, lighting, toilets, and maintainable planting. These are documented usability provisions. Standardized post-completion counts of older users and duration-of-use observations were unavailable; accordingly, underuse and volunteer overload were coded as prospective vulnerabilities.

Gangbei’s records identified irrigation, trimming, water-edge safety, tool storage, inspection, and the relationship between planting and environmental learning. These requirements show that ecological design and maintenance are inseparable. The documentary chain also recorded cross-boundary coordination needs without a durable post-completion allocation of all care tasks. The resulting diagnosis was an unresolved responsibility vulnerability.

Qiedong’s old-house materials recorded repair, ventilation, moisture control, lighting, wall and timber conditions, display fixtures, and public-access requirements. The records also described exhibitions, courses, and memory-oriented use, but sustained occupancy after restoration was not documented. Return to vacancy was therefore coded as a possible interruption mode [37].

Xiangcun's livelihood-oriented materials described shaded work and display areas, storage, tools, courses, markets, product management, and community exchange. These provisions indicate an intended interface between livelihood activity and shared space. Because maintenance reinvestment was not quantified, public-benefit feedback remained an evidence gap requiring review.

4.3. Functional Continuity and Public-Benefit Feedback

The second conversion condition concerns whether functions recur after a funded intervention or public event. The documents reported planned activities and, in some years, implemented events: care and exercise in Haishan; environmental learning and planting in Gangbei; exhibitions and courses in Qiedong; and workshops, markets, and exchange in Xiangcun. The corpus did not provide standardized post-completion frequency or attendance logs across the four cases.

The analysis therefore distinguishes planned frequency, documented implementation, and sustained actual frequency. A calendar or completion report documents intention or reported delivery; comparable follow-up logs are required to establish routine use between major events.

Public-benefit feedback is most visible as a design question in the Xiangcun case. Product sales, workshops, or branded experiences would contribute to stewardship only if part of the resulting value supported shared space, volunteer capacity, repair, or community funds. Because reinvestment was not quantified, the feedback mechanism remained an evidence gap requiring explicit specification [4,38,39].

The other cases present parallel conversion questions. Qiedong requires cultural programming to connect restoration with active use; Gangbei requires repeated ecological care and interpretation; and Haishan requires accessible, recurring social and care functions. Follow-up activity and maintenance records are needed to test actual continuity.

4.4. Social-Organizational Maintenance and Boundary Coordination

The third condition concerns who performs maintenance, with what authority and resources, and through which review routine. The documents repeatedly named task-specific needs—watering, trimming, inspection, cleaning, moisture management, storage, scheduling, repair procurement, course operation, and financial feedback. They also showed that participation alone could not replace technical capacity, stable funding, safe design, or named responsibility.

Gangbei illustrates boundary coordination. Its ecological and learning relations extend beyond a single administrative unit, while project eligibility and responsibility remain jurisdictionally organized. The documents identify the coordination problem; a functional-landscape platform is therefore proposed as a governance response [2,6,7].

Haishan's materials imply a potential mismatch between care-oriented use and volunteer capacity, but volunteer workload was not measured. Qiedong combines cultural programming with building-management tasks that may require external expertise. Xiangcun raises questions about shared equipment, repair, and benefit allocation. These are capacity requirements inferred from the documented tasks.

Review procedures can address these gaps when they move beyond compliance to request evidence about use, maintenance, and responsibility. The 2024 correction records indicate an emerging review orientation toward these questions.

4.5. Cross-Case Synthesis: Conversion Conditions and Interruption Modes

Figure 5 complements Table 5 by combining coordinate-verified context with an evidence-bounded diagnostic matrix. The revised figure uses textual categories—documented provi-

sion, continuity evidence, and inferred vulnerability or evidence gap. These are case-specific documentary categories rather than standardized ratings or rankings.

Four evidence-bounded findings emerge. First, no intervention type can be presumed sustainable from its output alone. Second, the three conversion conditions are complementary: a recorded strength in one condition does not verify continuity in the others. Third, event visibility is not equivalent to sustained function. Fourth, the corpus is richest on delivery and thinnest on post-completion operation. This evidence asymmetry is a substantive evaluation finding because it reveals what the project system records consistently and what it leaves uncertain.

5. Discussion

5.1. Conditional Stewardship as a Sustainability Mechanism

The theoretical contribution is to define a document-traceable conversion problem between project delivery and plausible post-delivery continuity. Place-keeping explains long-term management; stewardship explains actors, capacities, motivations, and relationships; adaptive governance and resilience explain learning and reorganization [1–3,11–20]. Conditional landscape stewardship adds an abductively refined diagnostic sequence: three interdependent conversion conditions, four interruption modes, and a weakest-link review heuristic. Its added value lies in locating where a project-to-stewardship transition appears vulnerable while keeping documentary findings separate from measured outcomes (Table 1).

The five-year documents support claims about recorded provisions, changing review attention, partial operating arrangements, and evidence gaps. Accordingly, the framework identifies possible mechanisms and vulnerabilities rather than certifying sustainability transformation.

The framework relates governance continuity to broader sustainability dimensions without replacing outcome assessment. Material–spatial usability can support accessibility, safety, environmental quality, and climate-responsive use; functional continuity can support inclusion, learning, care, culture, and livelihood activity; social-organizational maintenance can support accountability, adaptive capacity, and resource mobilization. Public-benefit feedback can connect economic activity to shared maintenance and distributive value. These are plausible pathways. Carbon reduction, biodiversity, social inclusion, and economic benefit still require direct indicators and follow-up evidence [4,5,16,17].

Recent indicator-based research at neighborhood and regional scales further shows why sustainability should not be treated as a uniform or automatically cumulative outcome. In Toronto, Shaker et al. [40] related landscape-configuration metrics to neighborhood well-being indicators and showed the value of integrating spatial and social measures. Across 44 Asian countries, Shaker and Mackay [41] identified geographically uneven development dimensions, limited spatial concordance, and trade-offs between ecological integrity and economic performance. These quantitative studies address different scales and outcomes from the present documentary analysis. Their findings nevertheless reinforce the rationale for treating conditional landscape stewardship not as a comprehensive sustainability index but as a project- and community-level diagnostic of whether the governance conditions needed to keep broader environmental, social, economic, and institutional benefits attainable are documented after delivery.

5.2. Implications for Sustainable Urban and Rural Development

The findings have four implications for project design and administration. First, the feasibility review should include maintainability before construction: routine tasks, technical requirements, replacement cycles, storage, safety inspection, and responsible

actors. Participation is essential for legitimacy and local knowledge, but it should not be treated as a substitute for technical capacity, stable finance, or explicit task allocation.

Second, funding should distinguish capital expenditure from stewardship expenditure. Short project cycles favor visible construction but underfund programming, repair, coordination, and learning. A modest post-completion stewardship budget, released against documented maintenance and public use, may create more sustainable value than additional construction. This recommendation is consistent with place-keeping research, which treats finance, governance, maintenance, and evaluation as a connected system [11,12].

Third, livelihood and tourism components should include a public-benefit feedback agreement. The objective is not to appropriate community income but to make explicit how commercial value supports shared assets. Possible mechanisms include a maintenance reserve, activity-based contributions, shared equipment funds, or transparent reinvestment in public-space repair. Without such a mechanism, “local industry” and “landscape stewardship” remain parallel rather than mutually reinforcing.

Fourth, peri-urban rural platforms should be organized around functional landscapes as well as administrative units. Coastal systems, water edges, paths, food networks, and learning relations cross district boundaries. Municipal guidance teams can act as facilitating operators by convening departments, communities, and professional knowledge around these relations [6]. The Hsinchu case suggests that small cities may be especially suitable for such platforms because spatial proximity allows rapid coordination, although limited staff and budgets increase vulnerability to discontinuity.

Together, these recommendations form the proposed two-stage governance checklist in Table 6. The ex ante review addresses maintainability, recurrent programming, role allocation, financing, public-benefit arrangements, and boundary coordination. The ex post review requests evidence on use, task completion, repair, organizational continuity, and benefit reinvestment. The checklist is analytically derived from the documentary study; it has not been validated as a standardized evaluation instrument.

Table 6. Proposed two-stage governance checklist derived from the documentary analysis.

Review Stage	Assessment Domain	Minimum Evidence Requested	Decision Use
Ex ante	Material–spatial maintainability	Access and safety check; task list; storage and tools; replacement cycle; responsible actor	Redesign, simplify, or defer when long-term burdens remain unresolved.
Ex ante	Functional continuity	Named operator; target users; recurring schedule; non-event use; service linkage	Test whether the output has a credible post-launch function.
Ex ante	Governance, finance, and boundary coordination	Role matrix; labor estimate; stewardship budget; repair and cross-boundary agreements	Establish accountable handover and resource commitments before construction.
Ex post	Actual use and functional continuity	Activity frequency; user groups; inactive periods; program logs; adaptations	Distinguish sustained use from episodic activation and identify decline.
Ex post	Maintenance performance and organizational continuity	Task, inspection, repair, expenditure, volunteer workload, and participation records	Identify the most vulnerable condition and request proportionate corrective evidence or support.
Ex post	Public-benefit feedback and adaptive learning	Reinvestment; community feedback; corrective actions; partner coordination; revised roles	Decide whether to continue, revise, scale, or discontinue support.

Note: This checklist is a proposed analytical and administrative aid, not a validated index, statutory requirement, or standardized pass–fail instrument. Its evidence requests and review triggers require contextual testing before formal implementation.

The proposed checks can be aligned with existing approval timelines rather than added as a separate administrative layer. Proposal guidance can request an initial maintenance-task list and intended users; plan review can require a named operator, role matrix, and recurrent-use plan; design approval can verify access, safety, repairability, and storage; completion and handover can confirm budgets, equipment, and responsibilities; first-year follow-up can request activity and repair logs; and the annual review can examine functional continuity and public-benefit feedback. Staging the evidence in this way reduces approval delay while addressing predictable burdens before capital investment is locked in.

To translate the four interruption modes into administrative action, the framework suggests an indicative policy-instrument menu rather than uniform statutory prescriptions. Completed-but-underused spaces may trigger a post-occupancy usability audit, a time-limited trial-use plan, or redesign before further capital support is approved. Event-dependent activation may require a recurrent-use calendar, a named operator, and staged follow-up funding tied to evidence of routine use between major events. Responsibility and resource gaps may be addressed through a maintenance memorandum, a designated stewardship arrangement, a ring-fenced maintenance budget, and cross-departmental coordination. Where livelihood income remains disconnected from shared maintenance, agencies may request a public-benefit reinvestment agreement, a transparent maintenance reserve, or periodic reporting on contributions to shared assets. These instruments are illustrative rather than mandatory and should be adapted to project type, community capacity, funding rules, and local legal authority.

5.3. *Transferability Beyond Hsinchu*

The four communities are not statistically representative, and the Rural Regeneration Act and municipal guidance arrangements examined here are institutionally specific. Transferability lies in the diagnostic questions rather than in copying the cases or thresholds: Is the output usable and repairable? Is there a recurrent function? Who is responsible? What resources support that responsibility? How is shared value returned? Which administrative or functional boundaries interrupt coordination?

Contextual calibration is essential. In centralized systems, vulnerability may arise from short funding cycles and vertical discontinuity. In fragmented metropolitan systems, cross-jurisdictional coordination and property responsibility may dominate. Rural communities may depend more heavily on volunteers and distant technical support; urban neighborhoods may face higher use intensity, more complex ownership, and professional management interfaces. Peri-urban settings combine these pressures. The relative weight of each condition may vary, but the core diagnostic question—whether usable space, recurrent function, and organized care are jointly supportable—remains applicable.

The framework can therefore inform heritage reuse, ecological restoration, village public space, community care, livelihood activation, and urban-neighborhood renewal, but the evidence and intervention triggers must be adapted to governance capacity, property arrangements, user density, funding rules, and technical systems. It is particularly useful for identifying what additional evidence is needed before a stronger sustainability claim can be made.

The case also contributes to reflexive documentary research. Practitioner access can reveal review comments, administrative corrections, and implementation tensions, but it must be disciplined by corpus transparency, source-purpose rules, counter-evidence, second-author challenge, and explicit claim limits. These safeguards make implementation processes inspectable without presenting insider interpretation as independent observation.

5.4. Limitations and Future Research

Three limitations most directly affect the validity of the core findings. First, the study relies on indirect documentary evidence and cannot verify actual long-term use, maintenance performance, or sustainability outcomes. Second, primary coding was conducted by one practitioner-researcher; the audit trail and second-author review reduce but do not eliminate positionality and interpretation risk. Third, funding scale and intervention intensity were not matched, limiting causal or performance comparison across cases. Secondary limitations concern the four-case analytical sample, the 2020–2024 observation window, the absence of environmental and social outcome measures, the coordinate-based rather than parcel-level map, and the compliance-oriented character of many project records. The framework should therefore be read as an analytically informed heuristic, not a validated performance model.

Future research should test the framework through standardized site audits, maintenance logs, activity frequency, repair expenditure, volunteer workload, and interviews with community, government, and professional actors. Independent or mixed evaluation teams should compare documentary claims with observed operation after handover and examine how capital expenditure, recurring stewardship expenditure, and intervention intensity shape maintenance burdens. GIS-based research should overlay official urban-planning boundaries, non-urban land classifications, agricultural-use zones, and project locations to test how regulatory location affects stewardship conditions. Comparative studies could examine whether the same interruption modes occur in larger metropolitan regions, remote rural areas, or different national funding systems. Longitudinal follow-up should also distinguish temporary activation from sustained stewardship over five- to ten-year periods.

6. Conclusions

Regarding RQ1, the documentary findings show that Hsinchu's 2020–2024 sequence moved from early participation growth toward greater attention to thematic coordination, correction, and maintenance questions. This represents a medium-term change in recorded governance emphasis.

Regarding RQ2, the four cases document different combinations of spatial provision, planned or reported function, and maintenance requirements. The analytical interpretation is that project-to-stewardship continuity appears more plausible when material-spatial usability, functional continuity, and social-organizational maintenance are jointly supportable. The four interruption modes identify prospective vulnerabilities and evidence gaps requiring follow-up verification.

Regarding RQ3, the study proposes an evidence-bounded governance response: separate documented findings from analytical vulnerabilities, use the weakest-link heuristic as a review trigger, and stage minimum evidence requests across proposal, design, handover, and follow-up checkpoints. Table 6 is a proposed checklist requiring future validation. The broader contribution is therefore diagnostic rather than evaluative certification: sustainability is not attached to completion but investigated as a continuing relationship among usable space, recurrent function, and organized care.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su18168056/s1>, Supplementary Note S1, Documentary Corpus, Coding Workflow, and Evidence-Boundary Controls; Table S1, Worked Examples of Documentary Coding and Evidence-Status Assignment; Supplementary Note S2, Coordinate Verification, Local-Only Mapping Procedure, and Spatial Evidence Boundaries; Figure S1, Local Study-Area Orientation and Coordinate-Verified Community Reference Locations; Table S2, Case Intervention Types, Maintenance Demands, and Comparison Basis; Supplementary Note S3, Corpus Inventory

and Evidence Reconciliation; Table S3, Documentary Corpus by Level, Case, Source Type, and Analytical Use; Table S4, Evidence-Status Decision Rules and Indicative Review Triggers; Table S5, Conflicting-Evidence and Source-to-Claim Examples. References [22–27,30–33] correspond to the main manuscript.

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