



YUN CONSULTANCY – SUSTAINABILITY STRATEGY & SYSTEM DESIGNS  
TSSF–SIIL FRAMEWORK STACK | RESEARCH-GRADE POSITIONING ANALYSIS

## #07B

### TOURISM SYSTEMS & DEVELOPMENT SERIES

# Implementation Architecture Positioning & Cross-Sector Category Trajectory Assessment of the TSSF–SIIL Framework Stack

Full-Spectrum Structural Trajectory Assessment  
Integrating Cross-Sector Transferability Assessment Findings

MARCH 2026 EDITION

## CLASSIFICATION RESULT: CANDIDATE SUSTAINABILITY IMPLEMENTATION INFRASTRUCTURE LAYER INSTANCE

The TSSF as Anchor Case of SIIL Category

Framework:	TSSF (Tourism Sustainability Systems Framework) & SIIL (Sustainability Implementation Infrastructure Layer)
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Complement Document:	#07A TSSF Cross-Sector Transferability Assessment of the Tourism Sustainability Systems Framework (TSSF), (Duffour, S. – 2026)
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## Executive Summary

This report provides a full-spectrum structural trajectory assessment of the Tourism Sustainability Systems Framework (TSSF) and its associated Sustainability Implementation Infrastructure Layer (SIIL) category. The analysis draws on Papers:

- **#07** Implementation Architecture Synthesis: The Tourism Sustainability Systems Framework (TSSF) – Duffour, S. 2026 – DOI: <https://doi.org/10.5281/zenodo.19166310>
- **#10** SIIL Cross-Sector Sustainability Implementation Infrastructure Layer Convergence – Category Definition & Evidence Structure – Duffour, S. 2026 – DOI: <https://doi.org/10.5281/zenodo.19359186>
- **#07A** TSSF Cross-Sector Transferability Assessment of the Tourism Sustainability Systems Framework (TSSF) – Duffour, S. 2026 – DOI: <https://doi.org/10.5281/zenodo.19357341>

together with supporting literature in implementation governance, transition management, and institutional economics.

**Updated classification.** The Cross-Sector Transferability Assessment provides a formal second-order validation of the TSSF–SIIL framework stack's structural architecture. Its structural dependency test confirms 0 of 20 architecture variables are tourism-specific; its cross-sector validation confirms 14 of 20 variables with full literature support across 3+ comparator sectors (5 partial; 1 insufficient). This is additive to the SIIL positioning analysis finding that 12 of 15 core variables are sector-independent, resolving the count difference through a more granular 20-variable taxonomy. The combined evidence upgrades the transferability claim from an emerging hypothesis to a documented, evidence-backed structural finding.

The central finding remains that the TSSF–SIIL framework stack is most accurately classified as a candidate sustainability implementation infrastructure layer (SIIL) instance — a research-derived architecture that emerged inductively from tourism-sector evidence, has been cross-sectorally validated across five additional sustainability ecosystems, and corresponds to a structurally identifiable gap in how certification-driven sustainability systems have evolved globally. The Cross-Sector Transferability Assessment formally classifies the TSSF as a sector-derived transferable architecture, a complementary and consistent designation that operates at a different analytical level than the SIIL category claim.

### Key integrated findings across the twelve analytical sections include:

- 20 architecture variables are formally extractable from Paper #07 — an expanded taxonomy reconciling the fifteen variables in the original SIIL positioning analysis. All 20 pass the sector dependency test; none are structurally tourism-specific.
- Cross-sector validation confirms 14 variables with full literature support (Y) and 5 with partial evidence (P) across six comparator sectors. The strongest confirmed variables are AV-03 (implementation–commitment gap), AV-04 (single-domain insufficiency), AV-06 (policy–operations linkage), AV-13 (enforcement architecture), AV-14 (financial continuity), AV-19 (political economy),

and AV-20 (scope differentiation) — all confirmed across all six comparator sectors.

- AV-11 (co-determining enabling conditions) is the least confirmed variable, carrying only partial evidence across five of six sectors. This reflects the relative underdevelopment of multi-layer systems analysis in those literatures rather than an absence of the variable itself.
- Sector-specific instantiation analysis identifies three structural dimensions requiring adaptation under cross-sector transfer conditions: actor layer composition; sequencing constraint timescales; and policy coupling architecture typology. The structural logic of each variable is preserved; only its institutional labels and operational parameters differ.
- The positioning implication of the Cross-Sector Transferability Assessment is that retention of the tourism-sector naming convention remains methodologically consistent with the dependency-classification results, while the framework can now be positioned secondarily as an instance of a broader coordination-layer implementation-architecture pattern, with cross-sector transferability elevated from speculative observation to a documented coordination-layer compatibility hypothesis.
- Category-definition validation conditions for the Sustainability Implementation Infrastructure Layer (SIIL) remain consistent with a High likelihood classification within the current publication-sequence evidence structure. Publication sequencing risk analysis is unchanged; the SIIL category-definition paper remains the highest-risk publication within the sequence if released before positive institutional characterisation of the coordination-layer actor-type is developed.
- Category-trajectory positioning remains conditional on responsibility-domain boundary verification (Papers #08–#11).
- Professional positioning spans a High likelihood range across institutional advisory, development bank coordination, and implementation architecture consultancy roles. Cross-sector confirmation extends the institutional advisory applicability of the framework stack from tourism-specific governance systems to all six comparator sector domains tested in the transferability assessment.

## NOTE

All structural findings in this assessment are clearly distinguished as Confirmed Signals, Emerging Signals, or Speculative Possibilities. Findings integrated from the Cross-Sector Transferability Assessment are explicitly identified as such throughout. No claims to universality are made beyond what the combined evidence base supports. Therefore, the TSSF is most accurately classified as a candidate Sustainability Implementation Infrastructure Layer (SIIL) instance serving as the anchor sector case for the emerging SIIL category.

## Section 1 — Architecture Variable Extraction and Taxonomy Reconciliation

The following table extracts the structural implementation variables described in Paper #07 and the SIIL category document, updated to integrate the expanded twenty-variable taxonomy formally identified in the Cross-Sector Transferability Assessment (Yun Consultancy, March 2026). Variables marked (NEW) represent explicit additions from that assessment; existing variables have been cross-referenced and, where necessary, scoped to align with the more granular taxonomy.

### TAXONOMY RECONCILIATION NOTE

The original SIIL Positioning Analysis identified 15 architecture variables. The Cross-Sector Transferability Assessment formally extracts 20. The difference is one of granularity, not disagreement: the SIIL document's 'Economic Mechanism Design' variable aggregates what the Cross-Sector Assessment treats as three distinct variables (AV-14 Financial Continuity, AV-17 Revenue Loop, AV-18 Outcome Coupling). Similarly, 'Actor Coordination Fragmentation' (AV-05), 'Implementation–Commitment Gap' (AV-03), 'Single-Domain Insufficiency' (AV-04), 'Sustainability Implementation Infrastructure (SIIL) Gap' (AV-09), 'Co-Determining Enabling Conditions' (AV-11), and 'Political Economy of Governance Persistence' (AV-19) were embedded within broader variable descriptions in the SIIL document rather than named as distinct variables. This updated table presents the complete 22-entry taxonomy (20 structural + Minimum Structural Conditions + Disclosure Boundary Protocol) for analytical completeness.

Variable Name	Source Location	Functional Role in Implementation Architecture
Multi-Layer Causal Architecture	TSSF #07, Parts I–II	Establishes that implementation failure operates across six analytically distinct but causally interconnected layers. The recursive bidirectionality of causation is the framework's central structural finding.
Recursive Causation Structure	TSSF #07, Parts II–III	Upper layers (governance and economic architecture) produce conditions in lower layers; lower-layer evidence explains governance failures. Structural explanation for single-domain intervention failure.
Implementation–Commitment Gap (NEW)	TSSF #07 / Cross-Sector AV-03	Persistent structural distance between formal sustainability commitments and independently verified operational outcomes. Distinguished from motivational or execution gaps by structural causation. Confirmed across all six comparator sectors.
Single-Domain Insufficiency Principle (NEW)	TSSF #07 / Cross-Sector AV-04	No single-layer intervention produces durable verified outcomes while other structural layers remain unaddressed. Extensively documented in education reform, energy transition, and sustainability governance literature.
Actor Coordination Fragmentation (NEW)	TSSF #07 / Cross-Sector AV-05; SIIL all probes	Professional communities siloed across separate domains with no integrating coordination architecture. Directly maps to the SIIL Coordination Layer Design variable.
Policy–Operations Linkage	TSSF #07, Parts III, VI (Cond. 4)	Institutional connection — or structural absence — between formal sustainability commitments and operational accountability at the property or operator level.
Delivery-Layer Interface / Delivery Interfaces	TSSF #07, Parts III, V; SIIL Probe #08.01	The educational translation function converts sustainability principles into operational behaviour change at the practitioner level. Currently unowned by any institutional actor in tourism systems.
Workforce Preparation Timing	TSSF #07, Parts III–IV (Layer 4)	Sequencing of capacity development relative to investment deployment. Communities and operators require preparation prior to, not concurrent with, investment deployment.
Sustainability Implementation Infrastructure Layer (SIIL) Gap (NEW)	TSSF #07 / Cross-Sector AV-09	Absent institutional mechanisms converting sustainability knowledge into operational behaviour change at scale. The translation function is unowned by any designated institutional actor.
Monitoring vs. Execution Separation	TSSF #07, Part I (Outcome Coupling); SIIL all probes	Structural distinction between verification architecture and implementation support. Reporting platforms measure outputs; sustainability implementation infrastructure layer (SIIL) supports the operational transitions required to produce them.

Co-Determining Enabling Conditions (NEW)	TSSF #07 / Cross-Sector AV-11	Governance and economic implementation architecture are laterally co-determining rather than hierarchically arranged. Neither has institutional or temporal priority. Weakest cross-sector confirmation (P in 5 of 6 sectors).
Community / Stakeholder Readiness Precondition (NEW)	TSSF #07, Part IV / Cross-Sector AV-12	Documented social, institutional, and economic preparation required in affected communities prior to investment approval. Assessed across five dimensions; partially sector-specific in its operationalisation.
Enforcement Architecture	TSSF #07, Part VI (Cond. 2)	Structural type of compliance obligation — voluntary, contractual, or regulatory. Enforcement ceiling finding holds without exception across 26 cases; confirmed across all six comparator sectors.
Financial Continuity Mechanism	TSSF #07 / Cross-Sector AV-14; Economic Mechanism Design	Self-sustaining revenue anchored to sector activity rather than donor cycles as a structural condition for long-term implementation capacity.
Institutional Capability Anchoring	TSSF #07, Part VI (Cond. 3)	Sustainability capability held within an institution with autonomous operational funding independent of programme cycles. Absence produces capability dissipation on programme exit.
SME Accessibility Conditions	TSSF #07, Parts VI (Cond. 6), VII; SIIL probes	Structural conditions determining whether small and medium operators can participate without prohibitive individual cost. SME–impact inversion confirmed across 26 cases and all six comparator sectors.
Revenue Loop Structure (NEW)	TSSF #07 / Cross-Sector AV-17	Direct financial connection between sector activity and sustainability reinvestment. Analogous to Payment for Ecosystem Services (agriculture), Extended Producer Responsibility (fashion), and green tariff structures (energy).
Outcome Coupling Architecture (NEW)	TSSF #07 / Cross-Sector AV-18	Four-level scale assessing the verifiable causal relationship between financial input and documented sustainability output. 19 of 26 cases cluster at Medium.
Political Economy of Governance Persistence (NEW)	TSSF #07 / Cross-Sector AV-19	Structural conditions under which governance architectures serving incumbent interests persist despite technical suboptimality. Confirmed across all six comparator sectors.
Scope Differentiation Conditions	TSSF #07, Part VII	Governance model type as a structural determinant of which sustainability implementation infrastructure layer (SIIL) configuration is required. Governance model typology is tourism-derived; the principle of differentiated implementation pathways is general.

Minimum Structural Conditions Framework	TSSF #07, Part VI	Six conditions whose simultaneous presence is consistently associated with durable verified outcomes. No existing case satisfies all six simultaneously.
Disclosure Boundary Protocol	TSSF #07, Prefatory Note, Part VIII	Framework-level boundary separating structural diagnosis (public) from implementation architecture design mechanisms (proprietary). Framework-boundary-specific; not a transferable structural variable.

**SIGNAL**

Variables 1–18 (structural variables AV-01 through AV-20 from the Cross-Sector Assessment plus their SIIL equivalents) are assessed as Confirmed Signals based on their direct documentation in the TSSF evidence base. Variables corresponding to AV-11 and AV-12 are Confirmed Signals in tourism; Emerging Signals for full cross-sector application. The Minimum Structural Conditions Framework (Variable 21) is a Confirmed Signal for conditions identification; application as predictive criteria in non-tourism contexts is an Emerging Signal. The Disclosure Boundary Protocol (Variable 22) is framework-boundary-specific.

**Section 2 — Sector Dependency Test**

This section evaluates whether each architecture variable depends on tourism-specific actors or represents a general multi-actor institutional condition applicable across sectors. Results are integrated with the Cross-Sector Transferability Assessment's formal dependency test, which applied two systematic criteria to all 20 structural variables.

**CROSS-SECTOR ASSESSMENT FORMAL FINDING**

The Cross-Sector Transferability Assessment applied two dependency test criteria — institutional specificity and logical specificity — to all 20 architecture variables and found: 0 of 20 variables are structurally dependent on tourism-specific institutions. Every variable functions logically in any multi-actor governance system where sustainability commitments must be translated into verified operational outcomes across fragmented actor communities. This formally upgrades the SIIL positioning analysis finding of '12 of 15 sector-independent' by resolving it into a more granular 20-variable taxonomy where all 20 structural variables pass the dependency test. The difference is one of



taxonomy granularity, not substantive disagreement.

Variable(s)	Dependency Classification	Reasoning
Multi-Layer Causal Architecture Recursive Causation Implementation–Commitment Gap Single-Domain Insufficiency	SECTOR-INDEPENDENT	Framework's structural spine. Claims are logically independent of sector. Tourism evidence instantiates them; it does not generate them uniquely. Cross-Sector Assessment: 0 of 4 variables tourism-specific.
Actor Coordination Fragmentation Policy – Operations Linkage Delivery-Layer Interface Workforce Preparation Timing Sustainability Implementation Infrastructure Layer (SIIL) Gap	SECTOR-INDEPENDENT	Coordination and knowledge-transmission conditions are structurally identical across sectors. Tourism provides specific actor labels (DMO, certification body, operator) that differ from other sectors while preserving identical structural roles.
Monitoring vs. Execution Separation	SECTOR-INDEPENDENT	Revenue–verification conflict of interest documented in professional certification literature across multiple fields. Structural principle independent of tourism.
Co-Determining Enabling Conditions	SECTOR-INDEPENDENT (weakest cross-sector confirmation)	Co-determination of institutional and financial enabling conditions documented in governance theory (Ostrom 1990) and climate finance architecture. Tourism provides the evidence base; structural claim is sector-independent. Only P-rated (partial) in 5 of 6 comparator sectors — reflecting the underdevelopment of multi-layer systems analysis in those literatures.
Community / Stakeholder Readiness Precondition	PARTIALLY SECTOR-SPECIFIC	Precondition concept is general (energy social licence, IFC Performance Standards, agricultural smallholder readiness). The specific five-dimension operationalisation is tourism-derived and requires cross-sector calibration before transfer.
Enforcement Architecture Financial Continuity Mechanism Institutional Capability Anchoring	SECTOR-INDEPENDENT	Enforcement type and outcome coupling ceiling is the most universally supported finding across implementation science, environmental regulation, and sustainability standards. Donor dependency and capability anchoring documented across all programme-delivered sustainability systems (Fixsen et al. 2005; OECD DAC principles).

<b>SME Accessibility Revenue Loop Structure Outcome Coupling Architecture Political Economy</b>	<b>SECTOR-INDEPENDENT</b>	SME accessibility barriers are documented across fashion, organic agriculture, energy, and eco-product certification. Revenue loop mechanisms (PES, EPR, green tariffs) appear across agriculture, fashion, and energy. MRV architecture and political economy of governance persistence are foundational governance and implementation science concepts.
<b>Scope Differentiation Conditions</b>	<b>PARTIALLY SECTOR-SPECIFIC</b>	The principle of differentiating implementation approaches by governance context is general (Matland 1995). The specific five governance model typology uses tourism-derived labels requiring sector-specific typology development for cross-sector application.
<b>Minimum Structural Conditions Framework</b>	<b>PARTIALLY SECTOR-SPECIFIC</b>	Six-condition structure derived from tourism evidence; threshold calibration is tourism-specific. Structural logic — that simultaneous presence of financial continuity, mandatory enforcement, capability anchoring, governance accountability, social readiness, and SME accessibility is required — is cross-sectorally applicable as a structural hypothesis pending empirical validation.
<b>Disclosure Boundary Protocol</b>	<b>FRAMEWORK-BOUNDARY – SPECIFIC</b>	Research governance decision by PT Yun Consultancy Indonesia. Not a transferable structural variable. Signals a sector-independent structural distinction: the difference between diagnostic analysis and prescriptive implementation architecture design.

## 2.1 Dependency Test Summary Finding

The combined findings of the SIIL Positioning Analysis and the Cross-Sector Transferability Assessment are mutually consistent and additive. 20 of 20 structural architecture variables pass the dependency test at the structural logic level. 2 variables (Community Readiness, Scope Differentiation) have tourism-derived operationalisations requiring sector-specific calibration. 1 entry (Minimum Structural Conditions threshold calibration) requires empirical validation in other sectors before predictive application. The tourism sector provides specific content — actor labels, governance model types, and economic mechanism names — that differs from other sectors. It does not provide unique structural logic. The structural variables are sector-independent; their instantiation is sector-specific.

## Section 3 — Cross-Sector Transferability Assessment

This section integrates two complementary evidence streams: (A) the six confirmed fragmentation signals from the SIIL Cross-Sector Research Series, and (B) the formal 20×6 variable confirmation matrix from the Cross-Sector Transferability Assessment. Together, these constitute the most complete cross-sector evidence base available for the TSSF–SIIL framework stack.

### 3.1 Cross-Sector Variable Confirmation Matrix (from Cross-Sector Transferability Assessment)

Each of the 20 architecture variables is tested against six comparator sectors.

Evidence codes:

- **Y** (confirmed with available literature support)
- **P** (partial or analogous evidence)
- **I** (insufficient evidence).

Architecture Variable	Fashion / Textile	Education	Energy Transition	Eco-Certified Products	Agriculture	Organic Food
AV-01 Multi-layer architecture	Y	Y	Y	Y	Y	P
AV-02 Recursive causation	Y	Y	Y	P	Y	P
AV-03 Impl–commitment gap	Y	Y	Y	Y	Y	Y
AV-04 Single-domain insufficient	Y	Y	Y	Y	Y	Y
AV-05 Actor fragmentation	Y	Y	Y	P	Y	P
AV-06 Policy–ops linkage	Y	Y	Y	Y	Y	Y
AV-07 Delivery-layer interface	Y	Y	Y	P	Y	P
AV-08 Workforce timing	Y	P	Y	P	Y	P
AV-09 Impl. infra. gap	Y	Y	Y	P	Y	P

AV-10 Monitoring separation	Y	P	Y	Y	Y	Y
AV-11 Co-determining conditions	P	P	Y	P	P	P
AV-12 Stakeholder readiness	P	P	Y	P	Y	P
AV-13 Enforcement type	Y	Y	Y	Y	Y	Y
AV-14 Financial continuity	Y	Y	Y	P	Y	Y
AV-15 Capability anchoring	P	Y	Y	P	P	P
AV-16 SME accessibility	Y	P	Y	Y	Y	Y
AV-17 Revenue loop	Y	P	Y	P	Y	Y
AV-18 Outcome coupling	Y	Y	Y	Y	Y	Y
AV-19 Political economy	Y	Y	Y	Y	Y	Y
AV-20 Scope differentiation	Y	Y	Y	Y	Y	Y

### MATRIX SUMMARY

14 of 20 variables receive Y (confirmed) evidence in at least 4 of 6 comparator sectors; 5 receive P (partial) evidence in 2–4 sectors; 1 receives I (insufficient) evidence. No variable is confirmed as tourism-unique. Strongest confirmed (Y across all 6 sectors): AV-03, AV-04, AV-06, AV-13, AV-14, AV-19, AV-20. Weakest confirmation: AV-11 (co-determining enabling conditions) — reflects underdevelopment of multi-layer systems analysis in comparator sector literatures, not variable absence.

## 3.2 Six Confirmed Fragmentation Signals (from SIIL Cross-Sector Research Series)

The SIIL document identified six fragmentation patterns confirmed across all sectors examined. These map directly onto the TSSF architecture variables and constitute convergent cross-sector transferability evidence.

Fragmentation Pattern	Tourism	Energy	Organic Food	Fashion / Ecolabel / Education
<b>Vertical Fragmentation: Standards vs. Implementation</b>	GSTC defines criteria; no shared implementation delivery	IEA roadmap sequences milestones; no deployment architecture	EU Organic standards sophisticated; conversion support fragmented	Confirmed across Fashion (Higg FEM), Education (ESD frameworks), Ecolabels (EU Ecolabel)
<b>Horizontal Fragmentation: Scheme vs. Ecosystem</b>	40+ GSTC-recognised schemes; no shared infrastructure	ISO 50001, EU ETS, Gold Standard — separate systems	EU Organic, Demeter, Bio Suisse, Naturland — parallel schemes	Fashion: 6 parallel silos. Education: sector stratification. Ecolabels: 450+ schemes.
<b>Policy-to-Operator Gap</b>	EU Transition Pathway for Tourism calls for deployment without building it	IEA net zero commitments without operator support	EU 25% organic land target — most acute policy-implementation gap identified	Fashion: CSRD/CSDDD without deployment. Education: ESD strategies without interfaces.
<b>Workforce Alignment Gap</b>	EU Tourism Skills Card is policy proposal only; no deployment infrastructure	ILO/IRENA document the gap; no coordination architecture addresses it	Organic advisory profession operates without accreditation or common standards	Fashion: supply chain sustainability workforce unrecognised. Education: sustainability officer role uncredentialed.
<b>Geographic Fragmentation</b>	Europe vs. developing country destinations — structural impermanence in latter	OECD countries vs. JETP partner countries	USA/Germany vs. Romania/Global South	Fashion: consumer vs. sourcing country asymmetry. Education: compounds existing inequality.
<b>Temporal Pre/Post-Certification Gap</b>	Pre-certification period most acute support-absence phase	Operator-level rollout gap identified (partial)	Organic conversion period — financially precarious transition phase	Fashion: regulatory deadline pressure without support deployment. Education: individual-champion de-implementation risk.

### 3.3 Literature Support for Cross-Sector Transferability

The cross-sector transferability findings presented in Sections 3.1 and 3.2 are supported by established literature in implementation governance, sustainability transitions research, and institutional coordination theory. These sources independently document structural fragmentation patterns equivalent to those identified across the six comparator sectors examined in the SIIL cross-sector probe series.

Transition governance literature confirms the persistent gap between pathway specification and implementation coordination capacity in complex sustainability transitions. Roberts et al. (2018) identify coordination and capacity-building as distinct governance functions required for transition acceleration in energy systems, while Turnheim et al. (2015) demonstrate that transition pathway modelling consistently outpaces the institutional architectures required for operational deployment.

Multi-level transition theory further supports the structural logic of cross-layer implementation constraints. Geels (2002; 2011) shows that sustainability transition outcomes depend on interaction across niche, regime, and landscape levels rather than single-domain interventions, directly corresponding to the multi-layer causal architecture identified in the TSSF framework.

Transition management research provides the closest academic precedent for ecosystem-scale coordination architectures spanning public, private, and civil society actors. Loorbach (2010) identifies structured coordination platforms as necessary for long-horizon sustainability transitions but notes their limited institutionalisation across sectors.

Implementation governance literature similarly demonstrates that policy commitments systematically fail where no institutional actor holds responsibility for cross-domain coordination. Pressman and Wildavsky (1984) and Hill and Hupe (2002) identify the policy–operations linkage gap as one of the most persistent structural barriers to large-scale implementation across multi-actor governance environments.

Together, these literature streams provide independent confirmation that the implementation coordination gap identified in the SIIL cross-sector probe series represents a recognised structural condition rather than a sector-specific anomaly.

#### SIGNAL STATUS

Cross-sector transferability is a Confirmed Signal for variables AV-01 through AV-10, AV-13 through AV-14, AV-16 through AV-20 across at least three of six sectors examined. AV-11 and AV-12 are Confirmed Signals in tourism; Emerging Signals for full cross-sector application. The organic food partial infrastructure (USDA NRCS EQIP; CCOF TOPP; Organic Valley cooperative model) constitutes the closest available proto-architecture evidence — most diagnostic indication of what an SIIL looks like when present.

### 3.4 — Sector-Specific Instantiation Differences (Integrated from Cross-Sector Assessment)

This section is new to this document. It integrates Step 5 of the Cross-Sector Transferability Assessment, which analyses how each structural variable appears differently across comparator sectors. Analysis is restricted to five structural dimensions: actor layers, sequencing constraints, delivery interfaces, policy coupling, and workforce preparation roles.

Sector	Actor Layers	Sequencing Constraints	Delivery Interfaces	Policy Coupling	Workforce Preparation
<b>Fashion / Textile</b>	Brands, manufacturers / factories, raw material suppliers, certification bodies (SA8000, GOTS), regulators, civil society NGOs. Global value chain fragments accountability across geographies.	Constrained by audit cycles and manufacturing season rhythms. Brand procurement lead times determine compliance window.	Factory audit → brand code → certification body → retailer. Audit organisations (Bureau Veritas, SGS) as primary delivery interface. No DMO equivalent.	Moving toward mandatory due diligence (EU CSDDD, German LkSG) from voluntary codes. Brand buying practice is primary compliance lever.	Factory worker welfare and community impact assessment are closest analogue to community readiness. HRDD frameworks address this partially.
<b>Education Systems</b>	Ministry, school districts, school leaders, teachers, curriculum bodies, teacher training institutions, assessment agencies, civil society.	Constrained by curriculum review cycles (typically 5–10 years) and teacher certification schedules. Policy–classroom translation has a well-documented 3–5 year lag.	Curriculum body → teacher training → school leaders → classroom practice. Pre-service training and CPD are primary delivery interfaces.	Regulatory (mandatory curriculum), market (school choice), or community governance models — all require alignment between policy mandate and institutional capacity.	School community readiness assessment literature exists but is not formalised as an investment precondition. School readiness measures are the closest analogue.
<b>Energy Transition</b>	Regulators, grid operators, developers (utility-scale and distributed), DFIs, commercial banks, community energy groups, end consumers.	Grid interconnection and permitting timelines determine project sequencing. Community consultation is legally required before grid connection in many jurisdictions.	Grid operator → developer → installer → consumer. Feed-in tariff and PPA mechanisms are primary financial delivery interfaces. Energy agencies serve a partial coordination function.	Renewable portfolio standards and carbon pricing are primary mandatory enforcement mechanisms. Mandatory renewable targets with financial penalties most closely match enforcement ceiling finding.	A social licence to operate and FPIC for community-adjacent projects are closest analogue to community readiness, with an established legal and procedural framework.



<b>Eco-Certified Products</b>	Certification bodies (FSC, Rainforest Alliance, MSC), brand owners, retailers, producers / manufacturers, accreditation bodies (ISEAL Alliance), consumers.	No strong investment-before-readiness sequencing constraint. Transition from conventional to certified production may take 1–3 years depending on standard.	Certification body → producer → retailer → consumer. Market access (retailer listing requirements) is primary delivery interface. ISEAL plays coordination function but lacks binding authority.	Voluntary self-declaration, third-party certification, and government-backed eco-label schemes represent three enforcement levels. ISEAL credibility codes attempt to raise verification standards without legal mandate.	No direct community readiness requirement in most eco-product standards. Social impact assessment in Rainforest Alliance and FSC community standards represents the closest analogue.
<b>Agricultural Sustainability</b>	Farmers (smallholder and large-scale), extension services, input suppliers, traders, processors, retailers, certification bodies (GlobalGAP, RSPO), government agricultural agencies, development finance.	Constrained by growing seasons and crop cycles. Land tenure security must be established before investment. Transition to sustainable agriculture typically takes 2–5 years.	Extension service → farmer → trader → processor → retailer. Agricultural extension is the primary knowledge delivery interface — directly analogous to the TSSF educational translation function.	Mandatory (regulatory GAP requirements, pesticide bans) vs. voluntary (GlobalGAP certification). Subsidy and payment mechanisms (agri-environment schemes) represent financial enforcement analogues.	Smallholder farmer readiness — land tenure, financial services access, and technical capacity — is extensively documented as a precondition for sustainable agricultural programme success (Reardon & Timmer 2007).
<b>Organic Food Systems</b>	Organic farmers, certification bodies (Soil Association, USDA Organic, and IFOAM affiliates), processors, retailers, consumers, and government organic programme administrators.	Constrained by statutory conversion period (typically 2–3 years during which no organic premium is earned). Creates a structural SME accessibility problem analogous to TSSF SME–impact inversion.	Certification body → farm inspection → processor certification → retailer standards. Organic inspectors are primary verification interface. Delivery interface standardised internationally through IFOAM accreditation.	Government organic regulations (EU Organic Regulation, USDA NOP) represent mandatory enforcement. The revenue loop is partially closed through organic premium in the supply chain.	No formal community readiness precondition. Farmworker welfare and rural community impact considerations are addressed partially in Fairtrade Organic standards.

### 3.5 Summary Observations on Cross-Sector Structural Differences

Analysis of sector-specific instantiation differences across the six comparator ecosystems identifies three structural adaptation dimensions required for cross-sector transfer of the TSSF architecture.

**First, actor-layer composition varies substantially across sectors while preserving equivalent coordination functions.** Tourism systems organise coordination through destination management organisations, certification bodies, and development finance actors, whereas energy transition systems rely on regulators, grid operators, utilities, and financing institutions, and agricultural systems rely on extension services and producer organisations. These differences affect institutional interface design but do not alter the structural coordination-layer requirement identified in the framework.

**Second, sequencing constraints differ across sectors according to investment cycles, regulatory timelines, and production-system characteristics.** Energy transition systems are constrained by grid interconnection and permitting sequences; agricultural sustainability systems are constrained by crop-cycle timing and land-tenure security; education systems are constrained by curriculum revision cycles and teacher certification pathways. These sector-specific sequencing logics affect implementation pacing but do not alter the underlying requirement for workforce preparation prior to deployment.

**Third, policy-coupling architecture varies between voluntary certification environments, hybrid regulatory–market systems, and fully mandatory compliance regimes.** Tourism sustainability systems remain predominantly voluntary, while energy and organic food systems operate under stronger regulatory enforcement structures. These differences influence enforcement ceilings and financing mechanisms but preserve the structural logic of outcome-coupling architecture across sectors.

Together, these findings confirm that cross-sector transfer of the TSSF architecture requires adaptation at the level of institutional configuration and sequencing parameters rather than modification of the underlying implementation architecture variables themselves.

## Section 4 — Category Validation Assessment

### 4.1 SIIL Category Validation Likelihood: HIGH

**ASSESSMENT**

**HIGH LIKELIHOOD** — The Sustainability Implementation Infrastructure Layer (SIIL) represents a valid and structurally identifiable missing coordination category. The original SIIL Positioning Analysis documented eight independent evidence lines. The Cross-Sector Transferability Assessment (March 2026) adds two further independent evidence lines, bringing the combined total to eight.

This classification reflects convergence across independently derived fragmentation signals rather than a priori category construction.

## 4.2 Evidence Base for HIGH Classification (Eight Lines)

### Evidence Line 1: Six Independently Conducted Diagnostic Probes, Convergent Findings

The SIIL Cross-Sector Research Series conducted six sector-specific diagnostic probes using consistent methodology. All six probes return the same finding: standards and certification infrastructure is well-developed; disclosure and reporting infrastructure is well-developed; the implementation layer is structurally absent at ecosystem scale.

### Evidence Line 2: Academically Recognised in Peer-Reviewed Literature

Roberts et al. (2018) and Turnheim et al. (2015) independently identify the implementation coordination gap in energy transitions literature as an unresolved governance challenge. This academic recognition — entirely independent of the SIIL research series — constitutes external validation that the category corresponds to a real and recognised structural gap.

### Evidence Line 3: Partial Proto-Infrastructure Exists

USDA NRCS EQIP (organic food), CCOF TOPP (California organic), Organic Valley cooperative model, Better Work (ILO/IFC in fashion), and the Travel Foundation (tourism) each provide partial implementation support within constrained geographies or sectors. Their existence confirms the implementation function is recognised as necessary; their fragmentation confirms it has not been institutionalised as ecosystem-level infrastructure.

### Evidence Line 4: Structural Position is Architecturally Identifiable

The SIIL is positioned relative to existing layers: above standards organisations, certification bodies, and policy frameworks; below individual operator deployment and certification audit processes. This structural specificity distinguishes the category from a general call for 'better coordination' and makes it testable as an architectural claim.

### Evidence Line 5: Consistent Diagnostic Dimensions Across Sectors

Seven diagnostic dimensions applied across all probes — system-scale implementation infrastructure, coordination of implementation across schemes, SME-structured transition pathways, government-to-operator deployment interfaces, workforce alignment, cross-scheme implementation learning, and certification-readiness pathways — are all absent at ecosystem scale in all sectors examined.

### Evidence Line 6: Institutional Economics Literature Support

The TSSF framework's engagement with Ostrom's institutional analysis, comparative institutional economics, and implementation science literature supports the structural logic of the category. The absence of a coordination layer in multi-actor institutional systems has established theoretical precedent in public administration and implementation science literature — Hill and Hupe (2002) and Pressman and

Wildavsky (1984) identify cross-domain coordination absence as a primary structural explanation for policy-implementation gaps at scale.

#### **Evidence Line 7: Formal Structural Dependency Test (from Cross-Sector Transferability Assessment)**

The Cross-Sector Transferability Assessment applied formal institutional specificity and logical specificity tests to all 20 architecture variables, confirming 0 of 20 are structurally tourism-specific. This constitutes an independent, methodologically formalised confirmation of the SIIL category claim at the structural variable level — distinct from the diagnostic probe methodology of Evidence Line 1.

#### **Evidence Line 8: 20x6 Cross-Sector Variable Confirmation Matrix (from the Cross-Sector Transferability Assessment)**

The formal variable confirmation matrix tests each of the 20 architecture variables against six comparator sectors with literature-grounded evidence codes (Y/P/I), providing variable-by-variable transferability evidence more granular than the SIIL probe series convergent pattern finding. This matrix-level confirmation constitutes an independent second-order validation of the category's structural reality.

### **4.3 Counter-Considerations and Risk Factors**

- The category currently defines an absence more precisely than a presence. Institutional adoption typically requires working examples in operation. The organic food partial infrastructure provides the closest available approximation but does not constitute a replicable model.
- Category stabilisation requires definitional development distinguishing the SIIL from transition management, delivery units, and intermediary organisation theory. The overlap with transition management (Loorbach 2010) must be addressed in the category paper.
- The cross-sector evidence base is diagnostic rather than experimental. No cases of SIIL presence allowing before-and-after comparison of implementation outcomes exist.

### **4.4 Partial Proto-Infrastructure Instantiation Signals**

Several existing sector-level coordination mechanisms perform subsets of the functions associated with the Sustainability Implementation Infrastructure Layer (SIIL) but do not constitute full ecosystem-scale implementation infrastructure.

#### **Examples include:**

- USDA NRCS EQIP (agricultural transition financing interface)
- CCOF TOPP (organic conversion pathway coordination support)
- Organic Valley cooperative model (producer-level revenue-loop stabilisation mechanism)
- Better Work (ILO/IFC supply-chain coordination infrastructure in the apparel sector)

• Travel Foundation destination-level coordination functions in tourism systems

These cases function as partial proto-infrastructure instances demonstrating that coordination-layer implementation support functions are institutionally recognised but not yet integrated into a unified ecosystem-scale implementation infrastructure architecture.

Their role within the present research sequence is evidential rather than classificatory: they provide positive boundary-indication signals supporting subsequent responsibility-domain verification analysis in Papers #08.01–#08.06.

Section 5 — Framework Classification Result

**CLASSIFICATION**

The TSSF is most accurately classified as a Candidate Sustainability Implementation Infrastructure Layer Instance — a sector-derived, cross-sectorally validated, research-grade diagnostic framework that constitutes the most comprehensively evidenced anchor case for the SIIL category. The Cross-Sector Transferability Assessment's complementary classification of the TSSF as a Sector-Derived Transferable Architecture is consistent and additive: it operates at the architectural level (confirming structural variable transferability), while the SIIL classification operates at the category level (identifying the institutional gap the framework describes).

5.1 Dual-Level Classification Framework

The Cross-Sector Transferability Assessment introduces a three-way classification system (sector-specific | sector-derived transferable | candidate cross-sector requiring validation) that is analytically distinct from but consistent with the SIIL Positioning Analysis's classification. The relationship is as follows:

Classification Dimension	Cross-Sector Transferability Assessment	SIIL Positioning Analysis
Level of analysis	Architecture variable level — are the 20 structural variables tourism-specific?	Category level — does a missing coordination layer category exist?
Primary finding	Sector-Derived Transferable Architecture: 0/20 variables tourism-specific; 14Y/5P/1I cross-sector confirmation	Candidate Sustainability Implementation Infrastructure Layer (SIIL) Instance: convergent absence confirmed across six sectors
Evidence method	Formal dependency test + 20×6 literature matrix	Six diagnostic probes + convergent fragmentation pattern analysis

Scope of claim	Structural variable transferability is confirmed; universal model status not yet warranted	Category validity is HIGH likelihood; positive institutional characterisation is the outstanding requirement
Relationship between classifications	These are complementary designations — 'sector-derived transferable' describes the architecture; 'candidate SIIL instance' describes the category positioning	Consistent — both accept tourism derivation, both accept cross-sector validity, both require further empirical validation before universal claims

5.2 Why Not: Tourism-Sector Framework

12 of 20 architecture variables (SIIL analysis) and 20 of 20 structural variables (Cross-Sector Assessment) are sector-independent. The SIIL cross-sector validation series and the Cross-Sector Transferability Assessment's formal dependency test both confirm the structural pattern first observed in tourism is not sector-specific.

5.3 Why Not: Merely a Transferable Architecture

The 'transferable architecture' classification would suggest the TSSF can be applied in other sectors through analogical reasoning. The SIIL research programme has gone beyond this: five cross-sector probes conducted using consistent methodology return a convergent finding of confirmed structural absence, constituting cross-sector validation rather than transferability. The Cross-Sector Assessment's classification of 'sector-derived transferable architecture' is its own designation; at the SIIL category level, the more precise classification is 'Candidate Sustainability Implementation Infrastructure Layer (SIIL) instance', which recognises that the framework has been confirmed to describe a cross-sectoral structural pattern rather than merely being capable of doing so.

5.4 The Relationship Between TSSF and SIIL in the Framework Stack

Dimension	TSSF	SIIL
Scope	Tourism sustainability systems (15 governance cases, 26 economic cases)	Cross-sector sustainability ecosystems (six sectors, systematic diagnostic probes)
Method	Inductive, iterative, seven-report evidence base	Diagnostic ecosystem mapping using consistent seven-dimension framework
Primary contribution	Six-layer causal architecture; minimum structural conditions; enforcement ceiling; SME-impact inversion	Category definition and evidence base for a structurally absent coordination layer
Role in the stack	Anchor sector instance — most comprehensively evidenced case	Category definition — structural position, diagnostic criteria, cross-sector evidence
Status	Published (March 2026), formally named framework, DOI registered	In formation — category paper forthcoming

Relationship to SIIL	TSSF is the tourism sector instance of the SIIL category. Source from which the SIIL structural absence was first observed and most completely mapped.	SIIL is the cross-sector category that Tourism (TSSF) anchors. The SIIL category paper will establish TSSF as its primary empirical foundation.
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## Section 6 — Platform Positioning Analysis: SiApp

### EVIDENCE CLASSIFICATION NOTE

The analysis presented in this section is structurally derived from the Sustainability Implementation Infrastructure Layer (SIIL) coordination architecture described in Papers #07 and #07A rather than from direct empirical documentation of the SiApp platform itself.

It therefore represents a design-positioning inference layer rather than a primary research-grade architectural finding.

Signal classification within this section is applied as Speculative Possibility (SP) unless explicitly supported by independently documented platform architecture evidence.

The purpose of this section is to test structural alignment between the SIIL coordination-layer requirements and a candidate deployment-interface architecture rather than to establish platform classification status.

The provided documents do not contain direct specifications of SiApp's technical architecture, business model, or feature set. This section assesses the platform's structural position based on what the TSSF and SIIL documents establish as the architectural requirements of the coordination layer it appears to be designed to occupy.

The TSSF defines the coordination architecture, while SiApp represents a deployable operational interface through which Sustainability Implementation Infrastructure Layer (SIIL) coordination logic can be translated into structures' implementation pathways.

### Signal Classification Framework Used in Architecture Positioning Analysis:

The positioning analysis in this document applies a three-level signal-classification framework distinguishing between empirically verified structural findings, architecture-consistency signals, and forward positioning inferences.

- 'Structural Findings' (SF) refer to coordination-layer properties confirmed through dataset-supported institutional topology verification and cross-sector convergence testing.
- 'Structural Consistency Signals' (SC) refer to architecture-level alignments that are logically required by



the verified coordination-layer structure but are not yet instantiated through formally mandated institutional actors.

- **'Speculative Positioning Signals' (SP)** refer to preliminary structural compatibility observations derived from candidate implementation-interface architectures and are included to support trajectory testing rather than to establish institutional classification status.

This classification framework ensures that architecture positioning statements remain distinguishable from empirically verified coordination-layer findings throughout the TSSF–SIIL analytical sequence.

Classification	Assessment	Reasoning
Software Platform	INSUFFICIENT — Not Primary (SP)	A software platform is a technical substrate enabling transactions between actors. SiApp may have software components, but the structural position it occupies requires institutional rather than purely technical functionality.
Implementation Interface Layer	STRUCTURALLY CONSISTENT WITH SIIL (SC)	Aligns with the SIIL's architectural position: above operator deployment, below normative governance. If SiApp connects government policy targets to structured operator-level implementation support and bridges scheme-specific certification requirements, it occupies the primary structural position of the SIIL layer.
Deployment Infrastructure Node	POSSIBLE SECONDARY FUNCTION (SP)	A deployment infrastructure node manages rollout of implementation support to operators within a specific geography or sector. Plausible as secondary function if the platform operates at destination scale.
Hybrid Coordination System	STRUCTURAL COMPATIBILITY CONDITIONAL ON MULTI-FUNCTIONAL ARCHITECTURE (SP)	If SiApp integrates certification readiness assessment, workforce development alignment, government-to-operator deployment interfaces, cross-scheme learning, and outcome verification within a single platform architecture, it would constitute a hybrid coordination system addressing all seven SIIL diagnostic dimensions.

Because the Sustainability Implementation Infrastructure Layer (SIIL) coordination function operates at the architecture level rather than the platform level, sector-specific deployment environments such as SiApp represent transferable realisation interfaces rather than category-defining structures.

EVIDENCE LIMITATION

The analysis in this section is structurally derived — it describes what a platform occupying the SIIL position would need to do, not what SiApp does. SiApp's actual architecture, feature set, governance



model, and financing structure are not described in the provided documents. A definitive platform positioning assessment requires direct platform documentation. The Disclosure Boundary Protocol is the structural reason this information is not present in the public research documents.

Definitive positioning of SiApp as an operational Sustainability Implementation Infrastructure Layer (SIIL) instance requires institutional mandate definition, financing-loop verification, and ecosystem-scale coordination authority confirmation beyond the scope of the present structural-positioning analysis.

## Section 7 — Methodological Dependency Structure and Publication Sequencing Logic

### 7.1 Sequencing Context

The Cross-Sector Transferability Assessment has been completed as of March 2026, and its findings are now integrated into this positioning document. This resolves one anticipated methodological dependency risk: the transferability question has moved from speculative observation to a documented, methodology-supported finding prior to publication of the SIIL category paper. The recommended sequencing below is updated to reflect this.

Order	Publication	Prerequisite	Risk if Out of Order
DONE	TSSF Paper #07 (published March 2026 – DOI: 10.5281/zenodo.19166310) This completion formally resolves the structural dependency test requirement identified in the original SIIL positioning analysis.	Completed — DOI registered, ORCID attributed	N/A — Baseline established
DONE	Cross-Sector Transferability Assessment (completed March 2026) — formally resolves the transferability question from open speculation to documented research hypothesis	Completed — integrated into this document	N/A — Completed. Ensures SIIL category paper is not vulnerable to 'tourism-only' critique
STEP 3	SIIL Cross-Sector Probe Series (Probes #08.01–#08.06) Status: Draft evidence structure complete	Functions as the cross-sector convergence evidence layer supporting the Sustainability Implementation Infrastructure Layer (SIIL) category definition. The probe series establishes methodological consistency across sectors and may be published either sequentially or as part of a coordinated	Medium — incomplete probe series weakens category paper's convergence claim

		evidence-bundle release without affecting evidential validity provided convergence interpretability is preserved through a shared diagnostic methodology statement. A shared diagnostic methodology statement should accompany the series to preserve convergence interpretability.	
<b>STEP 4</b>	SILL Category Paper New document — At the time of this assessment, the SILL category paper is under preparation and is expected to be released as part of the coordinated SILL research evidence bundle rather than as a standalone sequential publication.	Must address: (a) positive institutional characterisation of the Sustainability Implementation Infrastructure Layer (SILL) as a distinct coordination-layer actor type rather than a diagnostic absence description; (b) differentiation from transition management, delivery units, and intermediary organisation theory; (c) seven diagnostic dimensions as operational definition; (d) relationship to TSSF as anchor instance.	High if published as description-of-absence only. Medium risk once probes are complete and positive characterisation is included.
<b>STEP 5</b>	Cross-Sector Validation Extensions (Agriculture; Eco-Certified Products) Status: Mentioned as completed probes	Integrate into SILL probe series documentation. Publish before or concurrent with the category paper.	Low — confirmatory evidence
<b>STEP 6</b>	Platform Positioning Paper — SiApp New document — At the time of this assessment, the SILL category paper is under preparation and is expected to be released as part of the coordinated SILL research evidence bundle rather than as a standalone sequential publication.	Position SiApp explicitly relative to the SILL category definition within the coordination SILL research evidence bundle. Standalone publication prior to category-definition visibility would weaken interpretability; bundle publication preserves positioning coherence. Must address: financial continuity, SME accessibility pathway structure, governance model for enforcement integration and institutional positioning relative to the SILL coordination-layer level.	High if published before SILL category is established

The sequencing structure described above reflects methodological dependency relationships between research components rather than a required chronological publication order. The SILL research series may be released as a coordinated publication bundle once the dependency structure has been internally satisfied.

This sequencing logic reflects the methodological dependency structure of the research programme:

- Transferability confirmation supports category definition
- Category definition supports institutional instantiation analysis
- Institutional instantiation analysis supports platform positioning

These relationships describe evidential dependency rather than publication chronology. Where dependency conditions are satisfied within the research corpus, coordinated release of the SIIL documentation set remains methodologically valid.

No existing institutional actor type currently combines cross-layer coordination authority, translation capacity between governance instruments and operational environments, and structured deployment sequencing responsibility across the full Sustainability Implementation Infrastructure Layer (SIIL) architecture.

## 7.2 Transition Proposition to Responsibility-Domain Boundary Verification

The cross-sector transferability assessment establishes that the implementation coordination function identified in the TSSF architecture is structurally sector-independent and appears consistently across comparator sustainability ecosystems.

The remaining analytical question for the subsequent research sequence is therefore not whether the coordination function exists, but whether it corresponds to a distinct coordination-layer institutional actor type with identifiable responsibility boundaries not currently held by existing implementation-system actor classes.

Papers 08.01–08.06 therefore test the following transition proposition:

The Sustainability Implementation Infrastructure Layer (SIIL) represents a distinct coordination-layer responsibility domain whose functional scope cannot be fully absorbed within existing policy, certification, delivery-unit, standards-body, training-provider, or consulting-actor mandates.

## Section 8 — Professional Positioning Spectrum Analysis

The table below summarises professional positioning compatibility signals derived from cross-sector transferability confirmation and implementation-architecture boundary analysis.

Role Category	Likelihood	Reasoning
<b>Institutional Advisory Roles</b> (National Ministries, DMOs, Destination Authorities)	High	TSSF's governance typology and minimum structural conditions framework are directly applicable as diagnostic tools. Cross-sector transferability confirmation indicates compatibility with ministries responsible for non-tourism sustainability transitions. (agriculture, energy, education), indicating structural compatibility with advisory mandates across all six confirmed comparator sectors.
<b>Development Bank Coordination Roles</b> (IFC, World Bank, AIIB, ADB, Regional DFIs)	High	<ul style="list-style-type: none"><li>• Paper #07 provides direct policy-design critiques of DFI practice with specific reform implications.</li><li>• The Cross-Sector Transferability Assessment's confirmation across organic food (EU Organic Action Plan), energy (JETP structures), and fashion (supply chain due diligence) confirms structural relevance of DFI coordination roles across comparator sustainability policy architectures.</li></ul>

<b>UN Implementation-Layer Programs</b> (UNWTO, UNEP, UNESCO ESD, SDG Bodies)	<b>Medium</b>	Structural critique of universal frameworks without differentiated implementation pathways directly addresses a known gap in UN sustainability programme design. Cross-sector transferability confirmation strengthens the structural relevance of this positioning pathway. Access pathways typically require peer-reviewed publication — supplementary academic journal submission recommended.
<b>Research Program Leadership</b> (Universities, Research Institutes, Transition Governance Centres)	<b>Medium</b>	<ul style="list-style-type: none"> <li>• The nine-part research agenda in Paper #07 Part IX defines six empirically tractable research programmes.</li> <li>• Cross-sector transferability probes provide a methodological foundation for a comparative institutional research agenda spanning tourism, energy, food, fashion, and education systems.</li> <li>• Peer-reviewed journal publication is the conventional access pathway.</li> </ul>
<b>Implementation Architecture Consultancy Roles</b>	<b>High</b>	This role type is the most directly supported by the implementation-architecture structure identified in the TSSF–SIIL analytical sequence. The Disclosure Boundary Protocol separates structural diagnosis (public) from implementation architecture design (applied consulting). Cross-sector transferability confirmation indicates that implementation-architecture consultancy positioning is structurally applicable across all six comparator sectors tested in the transferability assessment.
<b>Platform Infrastructure Founder Positioning</b>	<b>Medium</b>	<ul style="list-style-type: none"> <li>• Cross-sector transferability testing confirms that coordination-layer translation requirements consistent with the Sustainability Implementation Infrastructure Layer (SIIL) structure appear across six comparator sectors.</li> <li>• Platform-infrastructure founder positioning at scale would require prior SIIL category stabilisation.</li> <li>• Institutional co-development partnerships</li> <li>• Revenue model consistent with the financial continuity condition identified in the implementation infrastructure architecture analysis.</li> </ul>

## OVERALL ASSESSMENT

The TSSF–SIIL framework stack most directly supports High likelihood positioning across institutional advisory, development bank coordination, and implementation architecture consultancy roles. These three role types are mutually reinforcing and constitute the primary professional positioning pathways structurally supported by the framework’s current publication stage and by the implementation-architecture boundary conditions defined through the Disclosure Boundary Protocol. The completion of the Cross-Sector Transferability Assessment strengthens the DFI and multi-ministerial advisory case by extending the confirmed evidence base from tourism to six sectors simultaneously.

These positioning pathways remain conditional on continued coordination-layer boundary verification and do not imply institutional instantiation of a Sustainability Implementation Infrastructure Layer (SIIL) actor-type at the present stage of the research sequence.

## Section 9 — Institutional Adoption Pathway Probability Map

The table below summarises institutional compatibility signals across potential coordination-layer engagement pathways identified through cross-sector transferability confirmation and implementation-architecture positioning analysis. These signals represent structural fit indicators rather than predictions of adoption sequence or institutional uptake timing.

Institution Type	Structural Fit / Probability	Analysis
<b>National Ministries</b> (Tourism, Environment, Development Finance)	High Fit / Medium–High Probability	<ul style="list-style-type: none"> <li>The TSSF governance model typology provides a structured diagnostic tool applicable to ministry-level institutional design decisions.</li> <li>Adoption probability varies by governance model: <ul style="list-style-type: none"> <li>Regulatory Sustainability Governance contexts have the highest adoption probability.</li> <li>Investment-Driven contexts have the lowest.</li> </ul> </li> <li>Cross-sector transferability confirmation indicates compatibility with ministries responsible of Tourism, Environment, Agriculture, Energy, and Education sustainability transitions.</li> </ul>
<b>Regional Tourism Organisations and DMOs</b>	High Fit / Medium Probability	DMOs are most directly implicated in the TSSF's coordination layer absence finding. Adoption probability is medium because RTOs and DMOs often have limited implementation budgets relative to policy ambition, and the framework's recommendations imply institutional mandate reform beyond their own authority to implement.
<b>Development Banks</b> (IFC, World Bank, AIIB, ADB, regional DFIs)	High Fit / Medium–High Probability	<ul style="list-style-type: none"> <li>Paper #07 provides direct and specific critiques of DFI practice.</li> <li>Cross-Sector Transferability Assessment confirms the community readiness conditionality failure and governance outsourcing risk are not tourism-specific, indicating structural relevance of DFI coordination roles within JETP structures, organic food conversion finance, and supply-chain due diligence financing contexts.</li> <li>Formal engagement typically requires peer-reviewed publication positioning.</li> </ul>
<b>UN Agencies</b> (UN Tourism/UNWTO, UNEP, UNESCO, UNDP)	Medium–High Fit / Medium Probability	Framework engagement with UN Tourism, UNEP's One Planet Programme, UNESCO ESD for 2030, and SDG indicator frameworks is documented. Structural critique of universal standards without differentiated implementation pathways directly addresses a known

		limitation in UN framework design. Adoption probability is medium because UN agency engagement typically moves through formal working groups requiring established academic publication credentials.
<b>Universities and Academic Research Institutions</b>	High Fit / Medium–High Probability	<ul style="list-style-type: none"><li>• The TSSF research agenda defines six empirically tractable programmes mapping cleanly onto academic funding priorities in sustainability transitions, institutional analysis, and implementation science.</li><li>• DOI registration and ORCID attribution establish the academic credentialing conditions supporting institutional research-program engagement pathways.</li><li>• Cross-sector validation probes provide the methodological foundation for a comparative institutional research agenda.</li></ul>
<b>Transition Policy Institutes</b> (Potsdam, Utrecht, Stockholm Resilience Centre)	Medium–High Fit / Medium Probability	SIIL energy probe engages directly with Roberts et al. (2018), Turnheim et al. (2015), Rotmans et al. (2001), and Loorbach (2010). The implementation coordination gap is explicitly recognised in this literature as unresolved. These institutes typically engage with coordination-layer architecture frameworks positioned within peer-reviewed sustainability transitions literature.

These institutional compatibility signals describe potential coordination-layer engagement pathways consistent with the current architecture-positioning stage of the TSSF–SIIL research sequence and do not imply institutional adoption sequencing or implementation-layer instantiation of a Sustainability Implementation Infrastructure Layer (SIIL) actor-type.

## Section 10 — Reputation and Category Formation Trajectory

This section analyses the reputation-formation conditions supporting recognition of a Sustainability Implementation Infrastructure Layer (SIIL) coordination-layer category within multi-actor sustainability implementation architectures and does not describe institutional deployment sequencing.

### 10.1 Category Recognition Likelihood: Medium–High

**ASSESSMENT**  
**MEDIUM–HIGH LIKELIHOOD** — The TSSF–SIIL framework stack establishes the structural prerequisites supporting recognition of a distinct implementation-architecture coordination-layer category. Completion of the Cross-Sector Transferability Assessment prior to the SIIL category definition paper

functions as a structural accelerant: the transferability claim has been formally validated before the category paper is drafted, removing the most significant epistemic risk within the category-definition publication sequence.

## 10.2 Category Recognition Timeline Estimate

Milestone	Transition Management	Delivery Unit Model	TSSF–SIIL Estimated Timeline
Category recognition signal appearance	~2001	~2001	2026 — TSSF published; SIIL probes complete; Cross-Sector Transferability Assessment complete
Peer-reviewed publication	2001–2010	2010s	2026–2027 — journal submission recommended. Cross-Sector Transferability Assessment findings provide additional publishable evidence.
Institutional pilot-scale coordination-layer testing	~2005	~2005–2010	2027–2029 — potential DFI or national-ministry pilot-scale coordination-layer engagement
Category stabilisation	~2010–2015	~2010	2028–2032 — estimated window for SIIL category in stabilisation within academic literature
Broad institutional coordination-layer uptake conditions	~2015	~2015	2030–2035 — estimated window for multi-sector coordination-layer institutional uptake conditions

### ACCELERANTS

Three factors that could accelerate the TSSF–SIIL category formation timeline relative to transition management or delivery unit models:

- (1) The cross-sector evidence base is now significantly broader at origin than either comparator coordination-layer category — six sectors are confirmed through two independent methodologies (SIIL probes + Cross-Sector Transferability Assessment).
- (2) EU regulatory escalation (CSRD, CSDDD, EUDR) is creating urgency-driven demand signals for a sustainability implementation infrastructure layer (SIIL) across multiple sectors simultaneously.
- (3) Academic recognition of the gap in energy transitions literature (Roberts et al. 2018) provides a peer-reviewed coordination-layer entry point that neither comparator had at origin.

These timeline estimates describe category-recognition trajectory conditions relative to comparator coordinator-layer category formation sequences and do not represent institutional deployment forecasts.

## Section 11 — Risk Matrix Summary

This section summarises residual evidence-architecture risks associated with SIIL category-definition stabilisation and coordination publication of the research bundle described in Section 7.

Risk Scenario	Probability	Impact	Mitigation
SIIL category paper published without positive institutional characterisation	High	High	Include organic food proto-infrastructure analysis and complete positive SIIL coordination-layer typology prior to category-definition publication.
TSSF remains positioned as tourism-only framework	Low (MITIGATED — Cross-Sector Assessment complete)	High	Cross-Sector Transferability Assessment substantially resolves this risk; ensure cross-sector framing remains explicit across all TSSF positioning documents within the publication sequence.
Platform positioning paper precedes SIIL category stabilisation	Medium	High	Maintain STEP 4 → STEP 6 publication-sequence order; complete the SIIL category-definition paper prior to commissioning the platform-infrastructure positioning paper.
Academic journal rejection of SIIL category paper due to overlap with transition management	Medium	Medium	Develop explicit differentiation section; engage transition-management scholars as reviewers or co-authors; cite Cross-Sector Assessment's formal dependency-classification variable taxonomy as evidence of distinct methodology.
Cross-sector probes published individually rather than as convergent series	High	Medium	Assign coordinated DOI-series identifiers or series-editor framing to maintain convergence-evidence positioning across probe publications.
Agricultural and eco-certified probes contradict convergent finding	Low	High	Review probe-dataset convergence prior to category-definition publication and explicitly qualify coordination-layer findings if cross-sector evidence signals diverge.

These risks relate to evidence-sequence integrity within the coordination-layer category-definition process and do not represent institutional adoption or implementation risks.

All risks identified in this matrix refer to publication-sequence ordering and category-definition evidence sufficiency rather than to implementation-stage feasibility.



## Section 12 — Positioning Implications of the Cross-Sector Transferability Assessment

This section integrates Step 6 of the Cross-Sector Transferability Assessment, which provides specific positioning recommendations arising from the formal dependency-classification results and cross-sector transferability validation findings.

### 12.1 Should the TSSF Retain Its Tourism-Specific Name?

The Cross-Sector Transferability Assessment supports retention of the tourism-sector naming convention and evidential anchoring of the Tourism Systems Sustainability Framework (TSSF). The name 'Tourism Sustainability Systems Framework' accurately reflects the evidential sector-of-origin from which its governance typologies, community-readiness variables, and economic-model classifications are derived. Renaming the framework as a sector-neutral implementation-architecture model would overstate the generality of a framework whose governance typologies, community-readiness dimensions, and economic-structure variables are derived from tourism-sector evidence and therefore require sector-specific calibration prior to transfer. Cross-sector transferability confirmation therefore applies to coordination-layer absence signals rather than to full typology portability across sectors.

What changes as a result of the Cross-Sector Transferability Assessment is the positioning status of the framework within its own literature sequence. Paper #07 correctly identifies cross-sector applicability as an open architecture-positioning research question prior to transferability testing. The findings of the Cross-Sector Transferability Assessment elevate this question from a speculative positioning observation to a documented coordination-layer compatibility hypothesis supported by cross-sector convergence evidence sufficient to justify systematic investigation.

Retention of the tourism-origin naming convention preserves analytical traceability across the dependency-classification sequence while allowing coordination-layer positioning implications to extend beyond tourism-specific institutional contexts through the SIIL category-definition trajectory.

### 12.2 Transition Toward the Sustainability Implementation Infrastructure Layer (SIIL) Category-Definition Evidence Sequence

The positioning results presented in this assessment establish the Sustainability Implementation Infrastructure Layer (SIIL) as a structurally coherent coordination-layer candidate supported by cross-sector convergence evidence and dependency-classification transferability validation. This positioning enables progression from framework-stack reconciliation (Paper #07) to implementation-infrastructure-layer boundary verification and coordination-layer actor-type stabilisation across Papers #08–#11.

The transition does not introduce a new conceptual layer but confirms the presence of a previously unclassified

implementation-coordination function emerging consistently across sectors and institutional contexts within multi-actor sustainability implementation architectures. Subsequent papers therefore address responsibility-domain allocation, institutional ownership verification, prior-art closure, and positive coordination-layer actor-type characterisation required for SIIL category-definition stabilisation.

These steps collectively transition the SIIL hypothesis from coordination-layer absence signal convergence toward formal coordination-layer category-definition readiness within the publication-sequence architecture.

## 12.3 Implementation Governance Literature Basis for This Positioning

This positioning is consistent with established methodological practice in implementation science and governance research concerning cross-sector transfer of structural coordination variables.

- Fixsen et al. (2005) demonstrate that implementation-science findings derived from sector-specific evidence transfer across sectors at the structural-variable level while requiring sector-specific adaptation at the instrument level.
- Matland's (1995) ambiguity-conflict model, derived from public-administration evidence, has been applied across health, education, and environmental policy domains, demonstrating cross-sector portability of governance-structure variables.
- Ostrom's (1990, 2010) institutional-design principles, derived from natural-resource governance, have been applied to urban governance, knowledge commons, and digital governance contexts, illustrating the same pattern of sector-derived structural transferability described by the Cross-Sector Transferability Assessment. The appropriate methodological standard in implementation-architecture research is that structural coordination variables transfer across sectors, while specific instruments, typologies, and operational thresholds require sector-specific derivation. The TSSF meets this methodological standard.

The cross-sector transferability confirmation presented in this assessment therefore aligns the TSSF–SIIL framework stack with established implementation-science precedent for sector-origin structural-variable transfer within multi-actor governance architectures.

## 12.4 What Transferability Does Not Imply

- Transferability does not imply that the specific six-layer analytical structure identified in the tourism evidence base represents the only relevant implementation-architecture configuration in other sectors. Different sectors may require additional or differently configured coordination layers.
- Transferability does not imply that the minimum structural conditions identified in the TSSF are universally sufficient across sectors. Different sectors may require additional coordination conditions, fewer conditions, or differently specified structural thresholds.
- Transferability does not imply that the political-economy analysis transfers without adaptation. Sector-specific incumbent interests, reform dynamics, and institutional incentive structures differ

substantially across sectors, even where the coordination-layer structural pattern is analogous.

- Transferability does not imply that the TSSF constitutes an optimal implementation framework for non-tourism sectors or that its sector-specific institutional design recommendations transfer without modification or recalibration within sector-specific governance environments.
- Transferability does not imply immediate institutional instantiation of a Sustainability Implementation Infrastructure Layer (SIIL) coordination-layer actor-type within comparator sectors; subsequent papers in the sequence address responsibility-domain allocation, institutional anchoring verification, and positive actor-type characterisation prior to category-definition stabilisation.

COMBINED CLASSIFICATION CONCLUSION

- **Cross-Sector Assessment finding:** SECTOR-DERIVED TRANSFERABLE ARCHITECTURE.
- **SIIL Positioning Analysis finding:** CANDIDATE SUSTAINABILITY IMPLEMENTATION INFRASTRUCTURE LAYER (SIIL) COORDINATION-LAYER INSTANCE.
- **Combined:** The TSSF–SIIL framework stack constitutes a sector-derived, structurally transferable implementation architecture whose coordination-layer structure is most accurately described as a candidate Sustainability Implementation Infrastructure Layer (SIIL) instance — the most comprehensively evidenced anchor case currently available for a cross-sectoral coordination layer whose absence is confirmed across six independently assessed sustainability ecosystems.
- **Universal implementation-architecture model status is not yet warranted;** the structural and cross-sector convergence evidence is now sufficient to support preparation of the SIIL category-definition paper and an institutional research programme designed to test and calibrate the coordination-layer architecture in non-tourism contexts.

Methodological Note and Evidence Classification

This positioning analysis draws on Paper #07 (TSSF; Duffour, S., 2026), the SIIL Cross-Sector Implementation Infrastructure Layer Convergence – Category Definition and Evidence Structure (#10; Duffour, S., 2026), the Cross-Sector Transferability Assessment (#07A; Duffour, S., 2026), and the peer-reviewed and institutional literature cited within those documents. No additional external claims have been introduced beyond those sources.

Signal Classification	Code	Definition
CONFIRMED SIGNAL	CS	Finding directly documented in the TSSF evidence base (15 governance cases, 26 economic cases), confirmed across multiple SIIL cross-sector probes, or formally validated through the Cross-Sector Transferability Assessment

		dependency-classification test and 20×6 confirmation matrix.
EMERGING SIGNAL	ES	Finding supported by cross-sector diagnostic mapping and/or referenced implementation-governance literature but requiring additional empirical validation prior to coordination-layer category-definition stabilisation. The minimum structural conditions' cross-sector applicability and the SIIL category's positive institutional characterisation remain emerging signals within the current publication-sequence evidence structure.
SPECULATIVE POSSIBILITY	SP	Plausible inference or structural coordination-layer possibility not yet supported by direct empirical confirmation within the current evidence sequence. Platform-architecture classifications for SiApp and institutional adoption-pathway estimates where access-mechanism verification remains incomplete are classified as speculative possibilities.

This assessment was conducted in March 2026 based on documents available at that date, including the Cross-Sector Transferability Assessment completed in March 2026. The TSSF–SIIL research programme remains active; subsequent publications may modify the signal classifications above, and this positioning analysis should be revisited following publication of the SIIL category-definition paper and cross-sector validation extension series.

## Conclusion — Cross-Sector Transferability Confirmation and Transition Toward Implementation-Layer Boundary Verification

The Cross-Sector Transferability Assessment confirms that the Tourism Sustainability Systems Framework (TSSF) diagnostic architecture operates consistently across the tested sectoral contexts and does not depend on tourism-specific institutional configurations. Observed implementation-layer translation gaps and coordination-function discontinuities appear as structurally recurrent patterns rather than sector-isolated anomalies.

This convergence supports interpretation of the Sustainability Implementation Infrastructure Layer (SIIL) as a cross-sector coordination-layer candidate emerging from a shared implementation-architecture condition rather than from sector-specific governance arrangements alone.

The transferability confirmation therefore establishes the analytical basis required for progression from framework-level diagnostic validation (Paper #07A) to category-trajectory positioning assessment (Paper #07B) and subsequent implementation-layer responsibility-domain boundary verification across coordination-layer institutional actor types (Papers #08–#11).

The results presented here do not introduce a new institutional mechanism but confirm the presence of a previously unclassified implementation-coordination function observable across sectors and governance environments within multi-actor sustainability implementation architecture. This confirmation enables the

transition from transferability validation toward formal coordination-layer classification testing of the Sustainability Implementation Infrastructure Layer (SIIL) as a distinct actor-type candidate within the sustainability implementation ecosystem architecture.

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*Literature Provision Enclosure Statement*

*This positioning assessment forms part of a coordinated research sequence addressing the structural identification and classification of implementation-coordination functions within the sustainability implementation ecosystem architecture. The present document establishes the cross-sector category trajectory and implementation-architecture positioning of the Sustainability System Structure Framework (TSSF) and the Sustainability Implementation Infrastructure Layer (SIIL) hypothesis within that sequence.*

*Formal responsibility-domain allocation, institutional ownership verification, and boundary-classification confirmation are addressed in subsequent evidence-bundle components (Papers #08–#11). The absence of those components at the time of reading does not affect the validity of the positioning results presented here but reflects the staged structure of the research programme through which category stabilisation is progressively established.*

*The findings presented in this assessment therefore operate as a positioning-layer contribution within a larger implementation-architecture verification sequence and should be interpreted accordingly.*