

Article

The Monitoring Paradox in Sustainable Destination Management: A Computational Analysis of the Actionability Index Across Iberian INSTO Members

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Abstract

Coastal and island destinations increasingly rely on data-driven governance to manage seasonality, resource scarcity, overtourism, and climate risk. This article analyzes 30 official documents issued between 2017 and 2025 by nine Spanish and Portuguese Sustainable Tourism Observatories in the UN Tourism INSTO network. Rather than treating observatory language as verified policy implementation, the study uses computational content analysis to measure institutional discourse about monitoring and action. The Actionability Index (ActI), action-share, and log-ratio metrics are interpreted as exploratory, compositional text indicators, not direct evidence of governance effectiveness. Results show a negative document-level association between monitoring intensity and the ActI ($r = -0.3951$, $p = 0.0307$, $\alpha = 0.05$), but denominator coupling and report-genre heterogeneity require a restrained interpretation: the pattern signals a monitoring-action imbalance that warrants follow-up validation rather than causal proof of a governance failure. Quartile-based profile labels are treated as sample-internal descriptors, with Barcelona interpreted as a boundary case whose action discourse is concentrated around tourism carrying capacity. A pre/post-2020 comparison is reported only as an unbalanced descriptive contrast. The contribution is a transparent, reproducible framework for auditing whether monitoring intelligence is connected to actionable discourse, together with explicit limits and validation priorities for future work.

Keywords: sustainable tourism observatories; destination governance; actionability index; computational content analysis; tourism carrying capacity; policy-action gap; multi-lingual NLP; INSTO



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1. Introduction

Destination Management Organizations (DMOs) increasingly govern destinations as complex socio-ecological systems in which visitor mobility, resident well-being, infrastructure capacity, environmental pressure, market dynamics, and climate exposure interact dynamically. Contemporary guidance positions DMOs as coordinators of evidence-based governance and destination resilience rather than promotion-only agencies [1,2]. This systems role is particularly consequential in mature Mediterranean and Atlantic

coastal destinations, where overtourism, seasonality, water stress, spatial concentration, and climate-related resource pressures can reinforce one another [3–5].

Sustainable Tourism Observatories (STOs), including observatories in the UN Tourism International Network of Sustainable Tourism Observatories (INSTO), were established to strengthen this evidence base through recurring measurement of destination pressures and sustainability indicators [6,7]. Indicator research shows that credible monitoring can improve destination learning, competitiveness, and sustainability assessment, while recent work on observatory performance emphasizes that observatories must also build organizational capacity, stakeholder trust, and practical decision support [8–13]. Their public value therefore depends not only on producing data, but on whether information enters feedback loops that connect diagnosis with priorities, budgets, regulations, incentives, stakeholder coordination, and implementation routines.

This conversion challenge is central to sustainable destination governance. Sustainability scholarship treats destination viability as a joint environmental, social, and economic problem [14,15], while carrying-capacity research emphasizes that visitation must remain within ecological, infrastructural, and social limits [16,17]. Because those limits are dynamic rather than fixed, observatories must do more than describe pressure; their intelligence must be coupled to governance instruments and negotiated across stakeholders with unequal authority, resources, and interests [18].

Previous studies identify several problems in this monitoring-to-action pathway. Research on observatories shows that they can mobilize knowledge and narrow science–policy gaps, but they can also remain concentrated on indicator inventories, periodic reporting, and knowledge brokerage without ensuring policy uptake [9–11,19]. Research on data-driven DMO decision-making similarly finds that analytical adoption depends on institutional capacity, stakeholder alignment, leadership, and the integration of data products into routine management [20]. These findings establish that more information does not automatically produce more actionable governance.

The related evidence-to-implementation literature explains why the translation may stall. Knowledge products must be embedded in routines, resources, incentives, leadership, organizational fit, and evaluation cycles before they alter practice [21–24]. Sustainable tourism policy research reaches a comparable conclusion: ambitious sustainability commitments can coexist with managerial arrangements that privilege measurement, coordination, or incremental adjustment over implementation [25]. Thus, the unresolved problem is not whether observatories generate useful evidence, but how visibly that evidence is coupled to instruments of action.

The problem is amplified by smart-tourism and digital-transformation agendas. Digitalization, platformization, artificial intelligence, and smart-destination infrastructures can increase sensing capacity, decision intelligence, and service innovation, but they also create governance concerns around data quality, accountability, trust, public value, and institutional readiness [26–34]. For STOs, this means that technological sophistication may expand the capacity to observe a destination faster than it expands the authority or routines needed to intervene. This tension aligns the present study with the Special Issue focus on smart and sustainable tourism systems, innovation management, and future governance challenges.

Three research gaps remain. First, existing studies primarily assess indicator systems, institutional roles, adoption conditions, or case-based science–policy relationships [8–11,19,20]; they do not provide a common document-level measure for comparing monitoring-action coupling across observatories. Second, cross-destination comparisons remain difficult because reports are multi-lingual, genre-diverse, and shaped by locally specific administrative vocabulary. Third, most assessments do not distinguish public dis-

course about action from verified implementation, creating a risk that reporting language will be overinterpreted as institutional performance. These gaps warrant investigation because they affect how destination stakeholders evaluate whether monitoring infrastructures are functioning as adaptive governance systems rather than as repositories of indicators.

The methodological literature reinforces these concerns. Automated text analysis is reproducible only when constructs, preprocessing choices, and validation procedures are transparent [35–38]. In addition, a ratio can generate a partly mechanical association when one of its components also appears in the denominator [39]. These problems remain unresolved in tourism-observatory research and are especially relevant when a study interprets the relationship between monitoring intensity and a monitoring-normalized action metric.

This study addresses those gaps through the Monitoring Paradox, defined here as a potential feedback-loop imbalance in which public observatory reports display extensive sensing and diagnostic language but comparatively less visible effector language concerning implementation, regulation, budgeting, incentives, restrictions, or mitigation. The concept is a diagnostic heuristic, not a claim that monitoring causes inaction. It asks whether the reporting interface reveals an imbalance that merits external validation against enacted policies, budgets, stakeholder processes, and destination outcomes [9,20–25,35–39].

The empirical setting comprises 30 official documents issued between 2017 and 2025 by nine observatories in Spain and Portugal. The regional focus offers a meaningful comparison among coastal, island, and urban destinations that share sustainability pressures but differ in reporting practices, policy specialization, and institutional maturity.

The research purpose is to develop and test an exploratory computational framework for assessing whether Iberian INSTO reports connect monitoring intelligence to actionable policy discourse.

The study pursues four objectives: (i) to define document-, observatory-, and period-level units of analysis; (ii) to construct transparent monitoring, actionability, and tourism-carrying-capacity lexicons; (iii) to evaluate denominator coupling through action-share, log-ratio, weighting-sensitivity, placebo, and Key-Word-In-Context checks; and (iv) to generate sample-internal observatory profiles while explicitly identifying boundary cases. The Actionability Index (ActI) is therefore treated as a compositional indicator of relative discourse emphasis rather than an independent measure of governance effectiveness.

The analysis is guided by three research questions. RQ1 asks how descriptive operational profiles vary across observatories and what distinguishes Strategic Integrators from Monitoring-Intensive Repositories. RQ2 asks whether monitoring intensity is associated with weaker action-oriented discourse after accounting for the compositional structure of the ActI. RQ3 asks whether the post-2020 recovery period shows a descriptive, crisis-related shift from passive reporting to intervention-oriented discourse.

By answering these questions, the article contributes to a systems-oriented audit procedure that links sensory and effector functions without conflating language with outcomes. The need for this procedure follows from the combined empirical, institutional, digital-transformation, and measurement gaps identified above: observatories are increasingly important governance infrastructures, yet the field lacks a transparent way to compare whether their public reporting connects evidence to action while preserving appropriate inferential restraint.

2. Literature Review

2.1. Sustainable Destination Governance and Tourism Carrying Capacity

Sustainable tourism research has long emphasized that destination competitiveness is inseparable from environmental protection, resident welfare, and the long-term viability of

local infrastructure [12–15]. More recent indicators and SDG-oriented reviews show that measurement systems are useful only when indicators are valid, locally meaningful, and connected to policy routines rather than used as static reporting checklists [8,11,13]. For coastal and island destinations, this link is particularly strong because resource constraints, seasonality, and spatial concentration intensify the consequences of unmanaged visitor growth [3–5]. Tourism carrying capacity (TCC) captures the maximum level of visitation a destination can absorb without unacceptable environmental, socio-cultural, or economic degradation [16,17].

From a systems perspective, TCC is not a fixed number but a dynamic operating boundary. Physical carrying capacity, social carrying capacity, infrastructure capacity, and ecological thresholds are continuously renegotiated through policy decisions, resident perceptions, visitor behavior, and technological mediation. Governance effectiveness therefore depends not only on whether an observatory measures pressure but also on whether it connects those measurements to instruments such as regulation, incentives, mobility management, taxation, investment, water-management planning, and mitigation [18,34].

2.2. *Observatories, Policy-Action Gaps, and the Monitoring Paradox*

Tourism observatories provide systematic information for destination planning, but their institutional value depends on how information is translated into decision-making. Urban and tourism observatories can mobilize knowledge during crises, yet they may also reproduce inventories of indicators without resolving the policy-action gap [19]. Recent observatory-specific work finds that success depends on clarity of purpose, stakeholder engagement, institutional embeddedness, and the capacity to turn data into management learning [9–11]. Work on data-driven DMO practice reaches a similar conclusion: analytics adoption depends on capacity, alignment, routines, and willingness to use evidence in managerial decision-making [20].

Smart-tourism research adds a further layer. Digital platforms, smart destinations, AI applications, and IT strategies can strengthen sensing and service innovation, but the literature also warns that smartness is not merely technological; it requires governance arrangements, public-value orientation, data stewardship, and organizational readiness [26–33]. Systems research on AI-enabled sustainable tourism, digital strategy in hospitality, digital-tourism readiness, and water-management governance further supports this view by showing that technology becomes valuable only when embedded in decision rules, institutional coordination, and sustainability objectives [31–34].

The Monitoring Paradox extends this literature by focusing on the reporting interface between measurement and response. It is not intended to replace policy-action or evidence-to-implementation frameworks. Instead, it operationalizes one observable symptom of those gaps: the possibility that monitoring terms dominate official discourse while implementation, regulation, budgeting, mitigation, or restriction terms remain comparatively weak. In this study, a higher ActI is interpreted as stronger action-oriented discourse, not as proof of better governance effectiveness. External validation against enacted policies, budgets, resident outcomes, environmental indicators, or pressure-reduction metrics would be required before making performance claims [21–25].

This contribution is therefore conceptual and methodological. Conceptually, it translates the sensory-effector logic of adaptive systems into a destination-governance setting. Methodologically, it offers a transparent audit procedure for multi-lingual observatory reports. The novelty lies in combining the Monitoring Paradox heuristic with explicit unit definitions, denominator-coupling safeguards, KWIC validation, and sample-internal profile rules, rather than in claiming that text counts directly measure institutional success.

2.3. Text-as-Data Measurement, Ratios, and Multi-Lingual Processing

The research design explicitly recognizes that the ActI is a compositional measure. In compositional data analysis, ratios can be informative, but an association between a component and a ratio containing that same component may be partly mechanical [39]. Text-as-data scholarship also stresses that automated measures require transparent construct definition, preprocessing, validation, and caution when moving from text patterns to causal inference [35–38]. To reduce overinterpretation, the analysis reports the ActI alongside action-share and log-ratio metrics. These checks do not eliminate all algebraic dependence, but they make the inference more conservative and transparent. The study therefore treats the baseline correlation as evidence of a descriptive monitoring-action imbalance, not as an institutional law or causal effect.

Multi-lingual processing is another methodological concern. Spanish and Portuguese institutional reports contain local administrative terminology, inflected forms, and destination-specific expressions that may not map perfectly onto English lexicons. The pipeline therefore combines sentence-level translation, lemmatization, original-language spot checks of high-frequency roots, and Key-Word-In-Context review. Neural machine translation can improve cross-language comparability, but rare and locally specific terms still require human validation [40,41]. Recent cross-lingual representation models such as XLM-R and LaBSE, together with massively multi-lingual translation models such as No Language Left Behind, suggest future validation paths in which language-specific semantic neighborhoods can be compared without relying exclusively on English translations [42–44]. Because the present corpus is small and domain-specific, transparent lexicons were retained as the primary estimator, while contextual embeddings are recommended as a supplementary robustness layer.

Finally, semantic network analysis (SNA) can identify bridge terms that connect monitoring discourse to policy discourse. In this study, SNA is treated as exploratory interpretive support rather than as an independent basis for assigning profiles. Betweenness centrality is used to identify terms that act as connectors between technical indicators and strategic action language [45]. As with all automated text-as-data methods, construct validity depends on whether the measured language corresponds to the theoretical construct of interest [35–38]. The present indices therefore measure discourse about action, not verified action itself.

3. Materials and Methods

3.1. Corpus, Scope, and Units of Analysis

The corpus consists of 30 official INSTO documents from nine Sustainable Tourism Observatories in Spain and Portugal, covering the period 2017–2025 (Table 1). The document is the primary observation unit for the reported Pearson sensitivity tests ($N = 30$). Observatory-level profiles are computed from aggregate densities by observatory ($N = 9$). The pre/post-2020 comparison is an unbalanced descriptive period contrast rather than a causal difference-in-differences estimate because report coverage is uneven across destinations, years, and document types.

Table 1. Condensed research database of INSTO reports used in the computational content analysis.

No.	Observatory	Years Represented
1	STO Mallorca	2023, 2024
2	Canary Islands	2022, 2023
3	Barcelona (OTB)	2017–2024

Table 1. *Cont.*

No.	Observatory	Years Represented
4	Biscay	2023
5	Malaga	2023
6	Algarve (AlgSTO)	2021–2024
7	Azores (OTA)	2020, 2021–2022, 2023–2024
8	Alentejo (ASTO)	2017, 2019–2025
9	Centro de Portugal	2023

Note: Multi-year reports were treated as the official document units available in the corpus; profile estimates aggregate document-level term densities by observatory. Country and report-type columns were removed to reduce redundancy, because all cases belong to the Spain–Portugal study region and report genre is discussed as a measurement limitation in the text rather than repeated in the table. Report genre, administrative style, and editorial conventions are acknowledged as potential sources of measurement error, so the corpus supports exploratory benchmarking rather than generalizable institutional ranking.

3.2. Preprocessing, Smart Extraction, and Linguistic Harmonization

Text was extracted through a rule-based Smart Extraction routine. The routine removes duplicated headers, footers, page numbers, figure labels, references, and non-substantive boilerplate before tokenization. Each retained passage is stored with observatory, report type, report year, source language, and section metadata. Institutional Emphasis Scaling is treated as a sensitivity assumption rather than a theoretically superior correction: neutral $1\times$ counts are compared with a $2\times$ interpretive-section scenario and a $3\times$ aggressive scenario for passages labeled as observations, comments, strategic recommendations, or critical technical indices. The $2\times$ scenario is a midpoint emphasis test, not a claim that such sections are twice as important in practice.

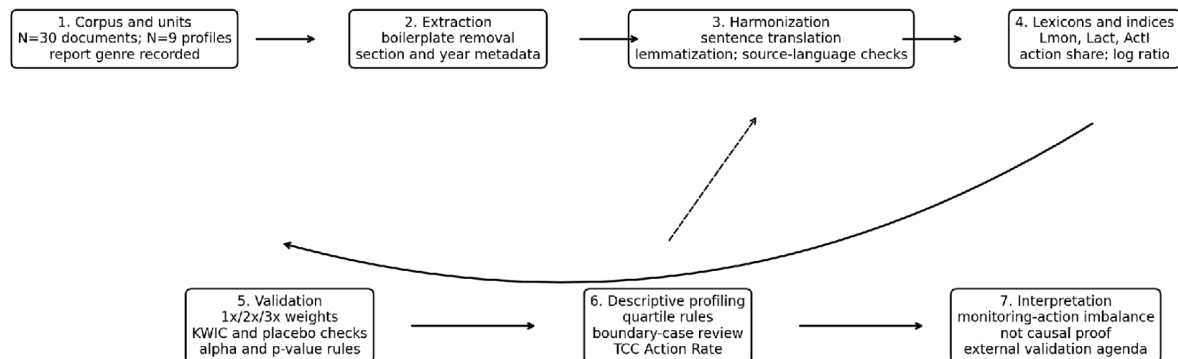
For language harmonization, Spanish and Portuguese passages were translated at the sentence level before English lemmatization. The pipeline retained metadata on source language, observatory, report year, and translated/non-translated status so that potential translation bias can be audited. To reduce false positives, high-frequency monitoring, action, and TCC terms were checked in their original-language forms, and KWIC passages with high local action scores were reviewed against the source-language context. This procedure cannot remove all translation artifacts, especially in public-administration terminology, but it makes the limitation visible and reproducible [40–44].

The analytic flow is summarized in Figure 1. The sequence moves from corpus definition and preprocessing to linguistic harmonization, lexicon construction, index calculation, validation, profile classification, and interpretation. The validation stage is deliberately placed before profile interpretation so that denominator coupling, weighting assumptions, and translation uncertainties are treated as boundary conditions rather than after-the-fact caveats.

3.3. Lexicons, Indices, and Formal Definitions

Two domain lexicons were constructed through a hybrid deductive–inductive process. The Monitoring Lexicon (Lmon) was seeded from ETIS/INSTO measurement language and then refined through corpus review of roots associated with indicators, data, auditing, measurement, and reporting [6–8]. The Actionability Lexicon (Lact) was seeded from governance and implementation language associated with regulation, budgets, restrictions, incentives, mitigation, and strategic intervention [1,9,20–25]. Candidate roots were retained when KWIC review showed that they usually captured the intended semantic function and were removed or interpreted cautiously when they mainly represented generic administrative phrasing. The validated roots are reported in Appendix A.

Computational content-analysis workflow and safeguards



Dashed feedback indicates that validation results are used to refine interpretation, not to assert causal effects.

Figure 1. Sequential methodological framework showing corpus definition, preprocessing, linguistic harmonization, lexicon construction, index calculation, validation, profile classification, and interpretation safeguards.

For document i , let M_i denote the weighted count of monitoring roots, A_i the weighted count of action roots, and N_i the number of valid tokens after preprocessing. Monitoring and action intensities are normalized per 1000 tokens: $Lmon_i = 1000 \times M_i/N_i$ and $Lact_i = 1000 \times A_i/N_i$. The baseline Actionability Index is $ActI_i = Lact_i/(Lmon_i + \epsilon)$, where ϵ is a small continuity constant used only to prevent division by zero. $ActI$ is therefore a text-based relative emphasis indicator. It should not be read as a direct measure of policy implementation, environmental performance, resident satisfaction, or budgetary commitment.

Because $ActI$ contains $Lmon$ in its denominator, two supplementary metrics are reported. The action-share metric is $AS_i = Lact_i/(Lact_i + Lmon_i)$, and the log-ratio metric is $LR_i = \log((Lact_i + \epsilon)/(Lmon_i + \epsilon))$. These measures help test whether the inverse pattern persists under alternative compositional representations, but they remain mathematically related to the same underlying term counts. For that reason, they are treated as safeguards against overstatement, not as complete solutions to denominator coupling.

The TCC Action Rate is defined as the percentage of TCC mentions that co-occur with at least one action-lexicon root within a symmetric 15-token window: $TCC \text{ Action Rate} = 100 \times W_{\text{action}}/W_{\text{TCC}}$. Here W_{TCC} is the number of TCC keyword windows, and W_{action} is the number of those windows containing at least one action root. Multiple action terms inside the same window are counted once, and each TCC mention forms its own window even when windows overlap. The 15-token window was chosen as a transparent compromise between local syntactic linkage and policy-discourse context: it is wider than a typical dependency span but narrow enough to avoid document-level co-mention, consistent with co-occurrence methods and evidence that meaningful dependencies are usually localized within short text spans [46–48].

For SNA, terms are connected when they co-occur in the same 15-token window. Betweenness centrality is calculated as $C_B(v) = \sum_{\{s \neq v \neq t\}} \sigma_{st}(v)/\sigma_{st}$, where σ_{st} is the number of shortest paths from term s to term t and $\sigma_{st}(v)$ is the

number of those paths passing through term v [45]. SNA outputs are used to contextualize KWIC evidence and not to determine profile membership.

3.4. Validation, Uncertainty, and Profile Rules

Validation proceeded in five stages. First, the $1\times/2\times/3\times$ weighting analysis tested whether Institutional Emphasis Scaling changed the direction or conventional significance of the document-level monitoring–ActI association. Second, a placebo procedure preserved document structure and lexicon size while randomly shuffling monitoring/action term labels, thereby testing whether the observed pattern was tied to semantic content rather than arbitrary word frequency. Third, KWIC review examined high-scoring passages to verify that automated counts corresponded to recognizable policy intent. Fourth, aggregate checks compared ActI with action-share and log-ratio metrics. Fifth, profile assignments were checked against transparent quartile rules and alternative monotonic normalization schemes. Statistical tests are two-tailed Pearson correlations. Alpha = 0.05 is used for conventional significance, while p -values between 0.05 and 0.10 are described only as exploratory or marginal.

Profile rules are sample-internal benchmarks. Strategic Integrators are observatories with ActI at or above the third quartile ($Q3 = 0.45$). Monitoring-Intensive Repositories combine high monitoring intensity (at or above $Q3 = 36.47$) with low ActI (at or below $Q1 = 0.13$). Targeted TCC Specialists combine low aggregate ActI with an unusually high TCC Action Rate above the TCC third quartile ($Q3 = 14.28\%$). Remaining cases are classified as Transitioning. These labels are descriptive and non-evaluative; they indicate discourse patterns in the available reports, not independent evidence of institutional strength or weakness.

Because only nine observatory-level cases are available, the profile taxonomy is sensitive to corpus composition. Monotonic transformations such as z -scores, min-max scaling, and percentile ranks preserve the ordering used by the quartile rules, but adding new observatories or replacing report genres could shift quartile thresholds. Boundary cases are therefore discussed explicitly rather than treated as stable classes.

4. Results

4.1. Statistical Validation and the Monitoring Paradox

The document-level analysis shows a negative association between monitoring intensity and the ActI under the $2\times$ interpretive-section scenario ($r = -0.3951$, $p = 0.0307$, $N = 30$, two-tailed Pearson, alpha = 0.05), as detailed in Table 2. This finding is reported as an inverse descriptive pattern in the analyzed corpus. It cannot establish that monitoring causes weaker actionability because the $ActI = Lact/Lmon$ and therefore embeds monitoring intensity in the denominator.

Table 2. Sensitivity analysis of Institutional Emphasis Scaling for the document-level monitoring–ActI association (two-tailed Pearson correlations; conventional alpha = 0.05).

Weighting Scenario	Pearson r	p -Value	Interpretation
$1\times$ neutral weighting	−0.4416	0.0146	Negative association remains significant at alpha = 0.05
$2\times$ baseline weighting	−0.3951	0.0307	$2\times$ interpretive-section scenario significant at alpha = 0.05
$3\times$ aggressive weighting	−0.3554	0.0539	Direction remains; $p = 0.0539$ is marginal and not significant at alpha = 0.05

Note: Table 2 was prepared by recalculating monitoring and action densities under neutral $1\times$ weighting, the $2\times$ interpretive-section scenario, and the $3\times$ aggressive scenario, then correlating document-level monitoring intensity with ActI. The table supports robustness of direction but does not remove denominator-coupling concerns; therefore, the association is interpreted as descriptive rather than causal.

The observatory-level aggregate data provide a conservative robustness check but are necessarily fragile at $N = 9$. Monitoring intensity remains negatively associated with action share ($r = -0.653$, $p = 0.057$, $N = 9$) and with the log-ratio transformation ($r = -0.614$, $p = 0.078$, $N = 9$), but both p -values are above $\alpha = 0.05$ and should be read as exploratory. The direct association between monitoring intensity and action intensity is weaker and not statistically significant ($r = -0.337$, $p = 0.375$). These results are consistent with a monitoring-action imbalance hypothesis, but they do not prove an institutional mechanism.

The sensitivity results therefore narrow the claim. The Monitoring Paradox is best understood as a diagnostic question for destination-governance systems: do public observatory reports show strong sensing functions without equally visible effector language? Answering whether this discourse pattern corresponds to actual implementation requires longitudinal designs and external outcome measures.

4.2. Comparative Operational Profiles

Biscay, the Azores, and Malaga are classified as Strategic Integrators because their ActI values are at or above the third quartile (Table 3). Biscay is the most balanced case, with a near one-to-one relationship between monitoring and action discourse. The Azores show lower monitoring intensity than Mallorca or Alentejo but stronger action orientation, while Malaga meets the high-ActI threshold and maintains relatively high action intensity. Malaga is close to the threshold and is therefore interpreted as a boundary case rather than as a categorical benchmark.

Table 3. Comparative operational profiles using consistent decimal conventions and sample-internal quartile rules.

Observatory	Monitoring Intensity	Action Intensity	ActI	TCC Action Rate (%)	Operational Profile (Descriptive)
Azores (OTA)	23.27	11.44	0.49	22.22	Strategic Integrator
Canary Islands	27.65	4.34	0.15	7.69	Transitioning
Malaga	33.47	15.34	0.45	12.50	Strategic Integrator
Centro de Portugal	31.69	7.88	0.24	0.00	Transitioning
Mallorca	62.97	6.06	0.09	14.28	Monitoring-Intensive Repository
Algarve (AlgSTO)	36.47	4.80	0.13	0.65	Monitoring-Intensive Repository
Barcelona (OTB)	31.76	1.46	0.04	55.94	Targeted TCC Specialist
Alentejo (ASTO)	39.12	10.44	0.26	7.14	Transitioning
Biscay	13.62	13.75	1.00	14.28	Strategic Integrator

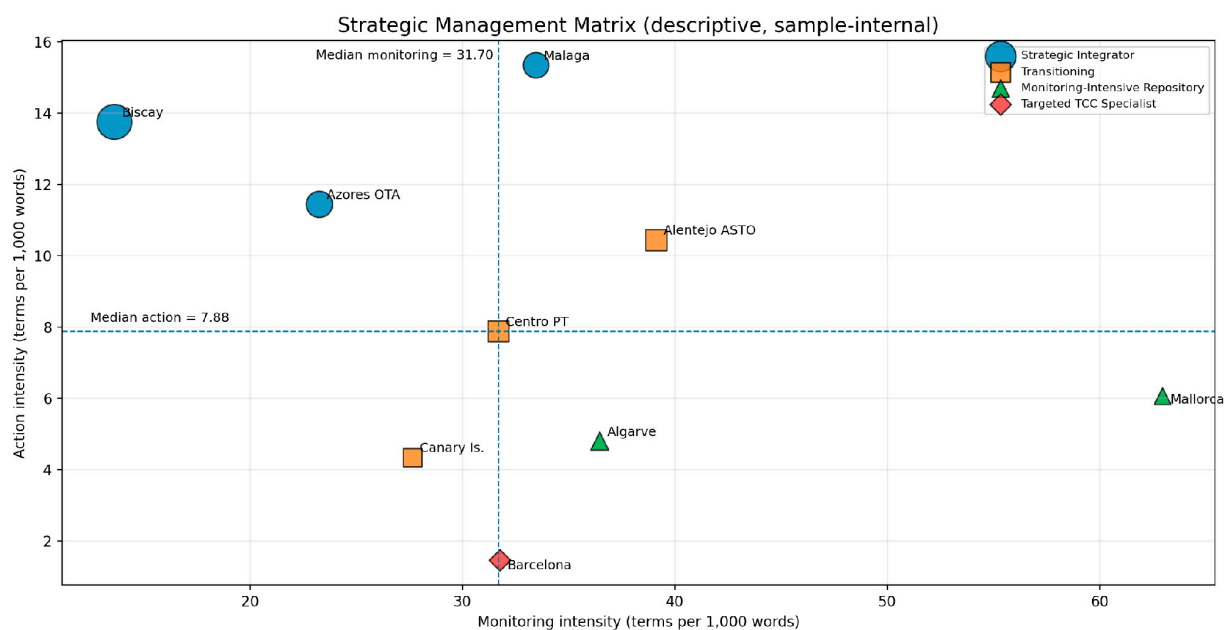
Note: Profile labels use the quartile-based rules described in Section 3.4. Labels are descriptive discourse profiles, not institutional performance rankings. Barcelona is classified as a Targeted TCC Specialist because its aggregate ActI is low but its TCC Action Rate is exceptionally high; this makes it a boundary specialization case rather than a generally high-actionability case.

Mallorca and the Algarve are classified as Monitoring-Intensive Repositories. Mallorca has the highest monitoring intensity in the sample (62.97 terms per 1000 words) but a low ActI (0.09), indicating that its available reports are strongly measurement-oriented. The Algarve shows a similar, though less extreme, pattern. This label does not imply poor governance performance; it indicates that the public documents emphasize measurement architecture more strongly than action discourse.

Barcelona is classified as a Targeted TCC Specialist. This rule is used because its aggregate ActI is low (0.04) while its TCC Action Rate is the highest in the sample (55.94%). The profile therefore captures specialization: action-oriented language is concentrated

around visitor saturation and carrying capacity rather than distributed across the full report. The case also illustrates a limitation of the aggregate ActI, which may understate actionability in destinations where intervention discourse is concentrated around one dominant pressure.

The Canary Islands, Centro de Portugal, and Alentejo are classified as Transitioning. Their reports contain action-oriented language but do not reach the high-ActI threshold. Centro de Portugal appears close to the median reference lines in Figure 2, but its ActI (0.24) is below Q3, its monitoring intensity is below the monitoring Q3 threshold, and its TCC Action Rate is 0.00; therefore, it does not meet the Strategic Integrator, Monitoring-Intensive Repository, or Targeted TCC Specialist rules. Alentejo is also near a stronger actionability profile because its action intensity is above the sample median, but its aggregate ActI remains below the Strategic Integrator threshold.



Centro de Portugal is a boundary case near the medians; Barcelona is classified by high TCC Action Rate, not by aggregate ActI.

Figure 2. Strategic management matrix showing monitoring intensity, action intensity, ActI bubble size, and descriptive profile labels. Median reference lines are visual guides only; profile labels are based on the quartile rules in Section 3.4.

4.3. TCC Action Rate, SNA Support, and KWIC Evidence

The formal TCC Action Rate clarifies why Barcelona differs from the Monitoring-Intensive Repository profile. The metric captures whether references to capacity, saturation, crowding, thresholds, and flows are linked to policy instruments within a fixed local context window. This approach prevents a destination from receiving a high TCC action score merely because TCC is frequently mentioned; the TCC mention must be connected to action language in the same local passage. It remains a discourse measure and does not verify that the policy instruments were enacted. The qualitative themes supporting these profile labels are summarized in Table 4.

KWIC scoring is defined as the weighted count of action-lexicon roots in the 15-token context window surrounding a monitoring, governance, or TCC keyword. Scores such as 4–6 therefore refer to the density of local action language, not to a subjective expert rating. High-scoring passages in Strategic Integrator reports typically connect indicators to budgets, execution, implementation, or specific plans. Monitoring-Intensive Repository reports more

often concentrate on diagnosis, source documentation, and indicator maintenance. This qualitative pattern supports the numerical profiles without replacing external validation.

Table 4. Non-redundant qualitative grounding of descriptive profile labels through KWIC review and exploratory SNA themes.

Profile	Dominant KWIC/SNA Bridge Themes	Interpretive Implication
Strategic Integrator	budget, execution, plan, implementation, regulation	Monitoring language is locally connected to administrative or policy-output terms.
Monitoring-Intensive Repository	indicator, source, diagnosis, metric, evaluation	Reporting emphasizes measurement architecture and evidence inventories rather than broad action discourse.
Transitioning	action plan, policy evaluation, incentives, stakeholder coordination	Reports show intent to bridge evidence and policy but with uneven intensity.
Targeted TCC Specialist	capacity, saturation, tourist tax, mobility, governance instruments	Action language is concentrated around high-pressure carrying-capacity constraints.

Note: Table 4 complements, rather than duplicates, the quantitative profile table by summarizing recurring bridge terms and policy frames observed in KWIC/SNA review. The themes are not independent quantitative profile rules and are not evidence of implementation outcomes.

4.4. Resilience Pivot After 2020

The pre/post-2020 comparison is consistent with a discursive resilience pivot: the ActI rises from 0.16 to 0.23, and action intensity increases more strongly than monitoring intensity (Table 5). Research on observatories and crisis governance suggests that shocks can temporarily intensify managerial language around coordination, mobility controls, health protocols, and recovery planning [19,49,50]. In tourism, COVID-19 also disrupted growth-oriented assumptions and increased attention to adaptation and risk management [49]. This shift in descriptive operational evolution is visually summarized in Figure 3.

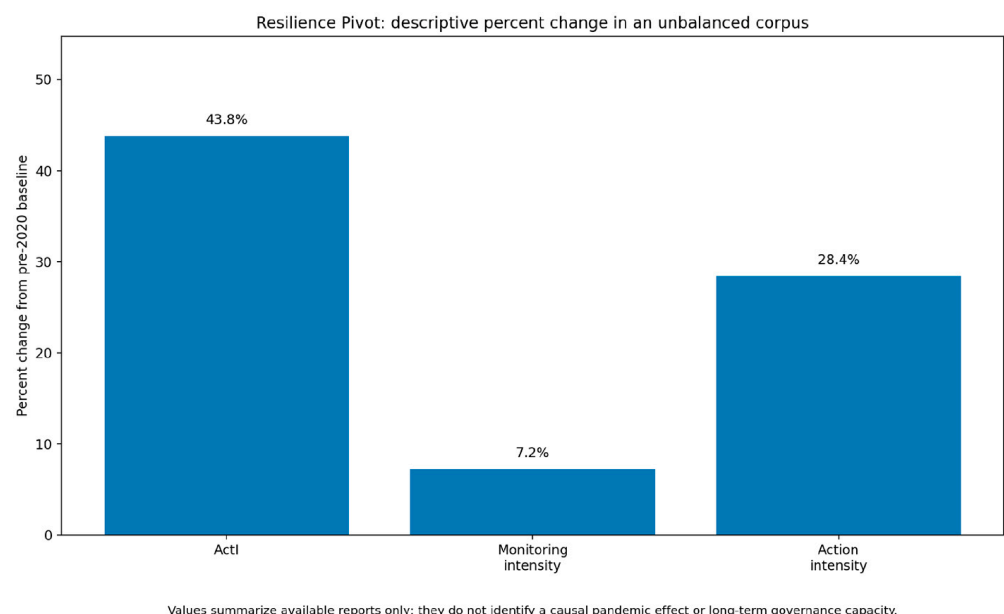


Figure 3. Reduced-size resilience pivot visualization expressed as a descriptive percent change from the pre-2020 baseline using the rounded values in Table 5; the corpus is unbalanced across periods.

However, the comparison cannot distinguish structural governance change from temporary crisis discourse. The pre-pandemic corpus is concentrated in fewer observatories, while the post-pandemic corpus includes more destinations and more heterogeneous report types. Without a balanced panel, within-observatory comparison, or independent policy-output measures, the result should be read as a descriptive shift in available reports rather than as evidence that the pandemic improved governance capacity.

Table 5. Descriptive pre/post-COVID-19 operational evolution.

Period	ActI	Monitoring Intensity	Action Intensity
Pre-COVID-19 period	0.16	32.78	5.56
Post-COVID-19 recovery period	0.23	35.15	7.14

Note: The rounded values imply an ActI increase of approximately 44%, a monitoring-intensity increase of approximately 7%, and an action-intensity increase of approximately 28%. Because report availability varies by year and observatory, this comparison is descriptive and should not be interpreted as a causal pandemic effect or as proof of long-term governance-capacity improvement.

5. Discussion

The results contribute to systems-oriented destination governance in three ways. First, they operationalize the distinction between sensory capacity and effector capacity in STOs: an observatory may be strong at sensing destination pressure while being less explicit about the policy instruments that convert evidence into action. Second, the study demonstrates a reproducible computational audit for benchmarking this conversion process across heterogeneous reports. Third, the Barcelona case shows why aggregate actionability cannot be the only interpretive outcome: a mature destination may concentrate action discourse around a narrow but critical constraint such as carrying capacity.

Compared with prior observatory studies, the present findings are convergent but more measurement-specific. Scuttari et al. [9] show that INSTOs can help bridge science and policy while remaining institutionally constrained; García-Altmann et al. [10] identify governance, stakeholder engagement, and operational clarity as observatory success drivers; and Torres-Delgado et al. [11] demonstrate that sustainable-destination monitoring depends on drivers and barriers beyond indicator selection. The present study extends these arguments by measuring how strongly monitoring and action vocabularies are coupled inside public reports, while avoiding the stronger claim that textual actionability equals implemented governance.

The findings also refine data-driven DMO and smart-tourism research. Novotny et al. [20] emphasize that analytics adoption depends on capacity, alignment, and routinization, while smart-destination research cautions that digital transformation requires governance, public value, and institutional readiness rather than technology deployment alone [26–30]. The comparatively low ActI observed in some monitoring-intensive reports is consistent with this literature: expanded sensing infrastructure may increase the volume of measurement discourse without automatically creating action routines, budget commitments, or regulatory instruments.

The principal finding—a negative document-level association between monitoring intensity and the ActI—should therefore be interpreted as a diagnostic signal rather than as a causal mechanism. It converges with studies of observatories and data-driven destination management that highlight science–policy gaps, institutional capacity constraints, and routine-building problems [9–11,19,20]. It differs from these studies by operationalizing the reporting interface across a multi-lingual corpus and by treating the observed inverse association as a descriptive discourse pattern rather than evidence that monitoring suppresses action.

The profile results also qualify indicator-centered assessments. Indicator systems can support competitiveness and learning [8], and recent SDG-related indicator reviews show the continued value of systematic sustainability measurement [13]. However, sustainability and carrying-capacity scholarship cautions that measurement must remain connected to ecological, social, and infrastructural boundaries [14–18]. The Strategic Integrator profiles of Biscay, the Azores, and Malaga display relatively close coupling between evidence and action language, whereas Mallorca and the Algarve emphasize measurement architecture. Barcelona departs from both patterns: its low aggregate ActI coexists with the highest TCC Action Rate. This specialization is consistent with the view that carrying capacity is destination-specific and dynamically governed, and it demonstrates why a single aggregate ratio can obscure concentrated intervention around a dominant pressure.

Methodologically, the results support cautions raised in text-as-data and compositional-measurement research. Automated counts can appear precise while remaining sensitive to construct definition, preprocessing, validation, and contextual interpretation [35–38], and correlations involving a ratio denominator may be partly mechanical [39]. The study addresses these limitations more explicitly than conventional keyword counts by reporting action share and a log-ratio, testing three weighting scenarios and a placebo, reviewing KWIC passages, and treating SNA as supporting rather than classificatory evidence. The directional robustness across alternative specifications strengthens the diagnosis, but the small observatory-level sample and denominator coupling prevent a causal or universal interpretation.

The post-2020 contrast should be read in the same restrained way. The higher action intensity in available post-2020 reports is compatible with evidence that crises increase attention to coordination, mobility controls, adaptation, and recovery planning [19,49,50]. However, unlike longitudinal crisis-governance studies, the present corpus is unbalanced across observatories, years, and report genres. The result therefore identifies a discursive resilience pivot rather than demonstrating that the pandemic produced durable governance reform.

The findings have two systems-level implications. Theoretically, they operationalize the distinction between sensing and effector functions: an observatory can expand information-processing capacity without making response mechanisms equally visible. Institutionally, the profiles suggest different translation needs. Monitoring-Intensive Repositories may require decision rules, budget links, or interorganizational authority; Transitioning observatories may require routines that embed evidence in implementation; and Targeted TCC Specialists may require complementary measures that detect concentrated action. These implications are consistent with implementation research emphasizing routines, resources, leadership, and fit [21–25], but they remain hypotheses to be tested with interviews, budget records, enacted regulations, and outcome data.

Several limitations define the agenda for future research. The corpus is restricted to 30 documents from nine Iberian and Macaronesian observatories, report genres and temporal coverage are uneven, and translation and lemmatization may alter term frequencies, particularly for locally specific administrative terms. Lexicon counts measure discourse about action rather than verified action; SNA is used only as exploratory support; the profile thresholds are sample-internal; and the pre/post-2020 comparison is not a balanced panel.

Future studies should replicate the analysis across INSTO regions, preregister lexicon and weighting decisions, compare transparent lexicons with supervised classifiers and cross-lingual embedding models [42–44], and validate the ActI and the TCC Action Rate against policy adoption, budget allocation, resident outcomes, environmental indicators, and pressure reduction. A public code, derived term counts, and a minimal reproducibility package would also permit direct replication and sensitivity testing.

6. Conclusions

This study presents an exploratory computational analysis of nine Iberian and Macaronesian Sustainable Tourism Observatories. The evidence supports a cautious version of the Monitoring Paradox as a monitoring-action imbalance in public reports: monitoring-intensive documents can show weaker relative action discourse, but the relationship must be interpreted with compositional safeguards and without causal overstatement. Strategic Integrators such as Biscay, the Azores, and Malaga show stronger integration between evidence and action language, while Mallorca and the Algarve illustrate a Monitoring-Intensive Repository pattern. Barcelona demonstrates a specialized pattern: a low aggregate ActI combined with high carrying-capacity action discourse.

The framework improves methodological transparency by defining observation units, clarifying the ActI construct, formalizing the TCC Action Rate and its 15-token rationale, limiting SNA claims, treating profile thresholds as sample-internal, expanding and reordering the supporting literature, and framing the pre/post-2020 pattern as descriptive crisis discourse. The revised claim is deliberately modest: the method can audit whether monitoring intelligence is linguistically connected to action discourse, but external validation is required before it can support strong comparative or policy-effectiveness conclusions.

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Abbreviations

The following abbreviations are used in this manuscript:

ActI	Actionability Index
CCA	Computational Content Analysis
DMO	Destination Management Organization
ETIS	European Tourism Indicator System
INSTO	International Network of Sustainable Tourism Observatories
KWIC	Key-Word-In-Context
NLP	Natural Language Processing
NMT	Neural Machine Translation
SNA	Semantic Network Analysis
STO	Sustainable Tourism Observatory
TCC	Tourism Carrying Capacity

Appendix A. Lexicons and Reproducibility Checklist

Table A1. Validated semantic lexicons used in the computational content analysis.

Lexicon Category	Validated Semantic Roots
Monitoring Lexicon (Lmon)	indicator; measure; survey; data; statistic; monitor; record; assess; observation; metric; benchmark; collect; analysis; database; tracking; inventory; diagnosis; evaluation; report; study; audit; census; performance; sample; methodology
Actionability Lexicon (Lact)	enforce; regulate; policy; strategy; implement; decision; tax; limit; invest; govern; manage; action; plan; mitigation; restrict; ban; incentive; execute; deployment; intervention; legislation; ordinance; budget; subsidize; prohibit
TCC keywords	capacity; carrying; saturation; crowding; threshold; pressure; overcrowding; bottleneck; encroachment; flows

Note: Roots were selected from ETIS/INSTO monitoring language, UN Tourism governance guidance, implementation and policy-action literature, and empirical review of the corpus. The lexicons measure discourse about monitoring and action; they do not validate actual implementation.

Table A2. Reproducibility checklist for computational specification.

Parameter	Computational Specification
Correlation unit	Document level, $N = 30$.
Profile unit	Observatory-level aggregate, $N = 9$.
Pre/post-comparison	Unbalanced descriptive period contrast; not a causal difference-in-differences estimate and not evidence of structural governance change.
Section weighting	$1 \times$ neutral reference, $2 \times$ interpretive-section scenario, and $3 \times$ aggressive sensitivity check.
TCC window	Symmetric 15-token window around each TCC keyword after tokenization and lemmatization; justified as a transparent local-context compromise.
Duplicate counting	Multiple action roots in the same TCC window are counted once; overlapping TCC windows are counted by TCC mention.
Profile thresholds	Sample-internal quartile rules using ActI, monitoring intensity, and TCC Action Rate; boundary cases should be reported.
SNA role	Exploratory support for KWIC interpretation; not used to assign profile labels.

Note: These parameters should be mirrored in any code or supplementary package submitted with the manuscript. External validation against policy outputs, budgets, resident outcomes, environmental indicators, or pressure-reduction metrics remains necessary before interpreting ActI as governance effectiveness.

References

1. World Tourism Organization. *UNWTO Guidelines for Institutional Strengthening of Destination Management Organizations (DMOs): Preparing DMOs for New Challenges*; UNWTO: Madrid, Spain, 2019. [\[CrossRef\]](#)
2. OECD. Building Strong and Resilient Tourism Destinations. In *OECD Tourism Papers*; OECD Publishing: Paris, France, 2025. [\[CrossRef\]](#)
3. World Tourism Organization. *“Overtourism”? Understanding and Managing Urban Tourism Growth beyond Perceptions*; UNWTO: Madrid, Spain, 2018.
4. Krabokoukis, T.; Polyzos, S. Analyzing tourism seasonality for the Mediterranean countries. *J. Knowl. Econ.* **2023**, *15*, 8053–8076. [\[CrossRef\]](#)
5. Tsiotas, D.; Krabokoukis, T.; Polyzos, S. Detecting tourism typologies of regional destinations based on their spatio-temporal and socioeconomic performance: A correlation-based complex network approach for the case of Greece. *Tour. Hosp.* **2021**, *2*, 113–139. [\[CrossRef\]](#)
6. UNWTO. *Rules for the Operation and Management of the UNWTO International Network of Sustainable Tourism Observatories (INSTO)*; UNWTO: Madrid, Spain, 2016.
7. European Commission: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. *The European Tourism Indicator System: ETIS Toolkit for Sustainable Destination Management*; Publications Office of the European Union: Luxembourg, 2016. [\[CrossRef\]](#)

8. Font, X.; Torres-Delgado, A.; Crabolu, G.; Palomo Martinez, J.; Kantanbacher, J.; Miller, G. The impact of sustainable tourism indicators on destination competitiveness: The European Tourism Indicator System. *J. Sustain. Tour.* **2021**, *29*, 1608–1630. [\[CrossRef\]](#)
9. Scuttari, A.; Windegger, F.; Wallnofer, V.; Pechlaner, H. Bridging the science-policy gap in sustainable tourism: Evidence from a multiple case study analysis of UNWTO INSTO sustainable tourism observatories. *J. Sustain. Tour.* **2025**, *33*, 628–652. [\[CrossRef\]](#)
10. Garcia-Altmann, S.; Hernandez-Martin, R.; Padron-Avila, H. What should tourism observatories be doing? Identifying key success drivers. *J. Place Manag. Dev.* **2025**, *18*, 192–213. [\[CrossRef\]](#)
11. Torres-Delgado, A.; Lopez Palomeque, F.; Elorrieta Sanz, B.; Font Urgell, X. Monitoring sustainable management in local tourist destinations: Performance, drivers and barriers. *J. Sustain. Tour.* **2023**, *31*, 1672–1693. [\[CrossRef\]](#)
12. Pan, S.Y.; Gao, M.; Kim, H.; Shah, K.J.; Pei, S.L.; Chiang, P.C. Advances and challenges in sustainable tourism toward a green economy. *Sci. Total Environ.* **2018**, *635*, 452–469. [\[CrossRef\]](#) [\[PubMed\]](#)
13. Rasoolimanesh, S.M.; Ramakrishna, S.; Hall, C.M.; Esfandiari, K.; Seyfi, S. A systematic scoping review of sustainable tourism indicators in relation to the sustainable development goals. *J. Sustain. Tour.* **2023**, *31*, 1497–1517. [\[CrossRef\]](#)
14. Saarinen, J. Traditions of sustainability in tourism studies. *Ann. Tour. Res.* **2006**, *33*, 1121–1140. [\[CrossRef\]](#)
15. Ritchie, J.R.B.; Crouch, G.I. *The Competitive Destination: A Sustainable Tourism Perspective*; CAB International: Wallingford, UK, 2003.
16. Marsiglio, S. On the carrying capacity and the optimal number of visitors in tourism destinations. *Tour. Econ.* **2017**, *23*, 632–646. [\[CrossRef\]](#)
17. Yusoh, M.P.B.; Mapjabil, J.; Hanafi, N.; Idris, M. Tourism carrying capacity and social carrying capacity: A literature review. *SHS Web Conf.* **2021**, *124*, 02004. [\[CrossRef\]](#)
18. Agius, K.; Chaperon, S. Stakeholder management and the imbalance of power: A central Mediterranean perspective on tourism in marine protected areas. In *Mediterranean Protected Areas in the Era of Overtourism*; Springer: Cham, Switzerland, 2021; pp. 117–135. [\[CrossRef\]](#)
19. Acuto, M.; Dickey, A.; Butcher, S.; Washbourne, C.L. Mobilising urban knowledge in an infodemic: Urban observatories, sustainable development and the COVID-19 crisis. *World Dev.* **2021**, *140*, 105295. [\[CrossRef\]](#) [\[PubMed\]](#)
20. Novotny, M.; Dodds, R.; Walsh, P.R. Understanding the adoption of data-driven decision-making practices among Canadian DMOs. *Inf. Technol. Tour.* **2023**, *26*, 331–345. [\[CrossRef\]](#)
21. Damschroder, L.J.; Reardon, C.M.; Widerquist, M.A.O.; Lowery, J. The updated Consolidated Framework for Implementation Research based on user feedback. *Implement. Sci.* **2022**, *17*, 75. [\[CrossRef\]](#) [\[PubMed\]](#)
22. Skivington, K.; Matthews, L.; Simpson, S.A.; Craig, P.; Baird, J.; Blazeby, J.M.; Boyd, K.A.; Craig, N.; French, D.P.; McIntosh, E.; et al. A new framework for developing and evaluating complex interventions: Update of Medical Research Council guidance. *BMJ* **2021**, *374*, n2061. [\[CrossRef\]](#) [\[PubMed\]](#)
23. Graham, I.D.; Logan, J.; Harrison, M.B.; Straus, S.E.; Tetroe, J.; Caswell, W.; Robinson, N. Lost in knowledge translation: Time for a map? *J. Contin. Educ. Health Prof.* **2006**, *26*, 13–24. [\[CrossRef\]](#) [\[PubMed\]](#)
24. Fixsen, D.L.; Naoom, S.F.; Blase, K.A.; Friedman, R.M.; Wallace, F. *Implementation Research: A Synthesis of the Literature*; University of South Florida, Louis de la Parte Florida Mental Health Institute: Tampa, FL, USA, 2005.
25. Hall, C.M. Constructing sustainable tourism development: The 2030 agenda and the managerial ecology of sustainable tourism. *J. Sustain. Tour.* **2019**, *27*, 1044–1060. [\[CrossRef\]](#)
26. Pencarelli, T. The digital revolution in the travel and tourism industry. *Inf. Technol. Tour.* **2020**, *22*, 455–476. [\[CrossRef\]](#)
27. Baggio, R.; Micera, R.; Del Chiappa, G. Smart tourism destinations: A critical reflection. *J. Hosp. Tour. Technol.* **2020**, *11*, 407–423. [\[CrossRef\]](#)
28. Cerda-Mansilla, E.; Tussyadiah, I.; Campo, S.; Rubio, N. Smart destinations: A holistic view from researchers and managers to tourists and locals. *Tour. Manag. Perspect.* **2024**, *51*, 101223. [\[CrossRef\]](#)
29. Gursoy, D.; Luongo, S.; Della Corte, V.; Sepe, F. Smart tourism destinations: An overview of current research trends and a future research agenda. *J. Hosp. Tour. Technol.* **2024**, *15*, 479–495. [\[CrossRef\]](#)
30. Yan, D. Bibliometric Analysis of Smart Tourism Destination: Knowledge Structure and Research Evolution (2013–2025). *Tour. Hosp.* **2025**, *6*, 194. [\[CrossRef\]](#)
31. Song, D.; Chen, H. Artificial Intelligence as a Catalyst for Sustainable Tourism: A Case Study from China. *Systems* **2025**, *13*, 333. [\[CrossRef\]](#)
32. Wynn, M.; Lam, C. Digitalisation and IT Strategy in the Hospitality Industry. *Systems* **2023**, *11*, 501. [\[CrossRef\]](#)
33. Sorooshian, S. Implementation of an Expanded Decision-Making Technique to Comment on Sweden Readiness for Digital Tourism. *Systems* **2021**, *9*, 50. [\[CrossRef\]](#)
34. Perez-Matamoros, Z.; Tejeida-Padilla, R.; Badillo-Pina, I.; Berdeja-Rocha, E.M. A Systems Science Approach to Sustainable Water Management in Rural Tourism Communities. *Systems* **2025**, *13*, 1088. [\[CrossRef\]](#)

35. Grimmer, J.; Stewart, B.M. Text as data: The promise and pitfalls of automatic content analysis methods for political texts. *Political Anal.* **2013**, *21*, 267–297. [[CrossRef](#)]
36. Roberts, M.E.; Stewart, B.M.; Tingley, D.; Lucas, C.; Leder-Luis, J.; Gadarian, S.K.; Albertson, B.; Rand, D.G. Structural topic models for open-ended survey responses. *Am. J. Political Sci.* **2014**, *58*, 1064–1082. [[CrossRef](#)]
37. Grimmer, J.; Roberts, M.E.; Stewart, B.M. *Text as Data: A New Framework for Machine Learning and the Social Sciences*; Princeton University Press: Princeton, NJ, USA, 2022.
38. Egami, N.; Fong, C.J.; Grimmer, J.; Roberts, M.E.; Stewart, B.M. How to make causal inferences using texts. *Sci. Adv.* **2022**, *8*, eabg2652. [[CrossRef](#)] [[PubMed](#)]
39. Aitchison, J. *The Statistical Analysis of Compositional Data*; Chapman & Hall: London, UK, 1986.
40. Sennrich, R.; Haddow, B.; Birch, A. Neural machine translation of rare words with subword units. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics, Berlin, Germany, 7–12 August 2016*; Association for Computational Linguistics: Stroudsburg, PA, USA, 2016; pp. 1715–1725. [[CrossRef](#)]
41. Koehn, P. *Neural Machine Translation*; Cambridge University Press: Cambridge, UK, 2020.
42. Conneau, A.; Khandelwal, K.; Goyal, N.; Chaudhary, V.; Wenzek, G.; Guzman, F.; Grave, E.; Ott, M.; Zettlemoyer, L.; Stoyanov, V. Unsupervised cross-lingual representation learning at scale. In *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics, Online, 5–10 July 2020*; Association for Computational Linguistics: Stroudsburg, PA, USA, 2020; pp. 8440–8451. [[CrossRef](#)]
43. Feng, F.; Yang, Y.; Cer, D.; Arivazhagan, N.; Wang, W. Language-agnostic BERT sentence embedding. In *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics, Dublin, Ireland, 22–27 May 2022*; Association for Computational Linguistics: Stroudsburg, PA, USA, 2022; pp. 878–891. [[CrossRef](#)]
44. NLLB Team; Costa-jussa, M.R.; Cross, J.; Celebi, O.; Elbayad, M.; Heffernan, K.; Kalbassi, E.; Lam, J.; Licht, D.; et al. Scaling neural machine translation to 200 languages. *Nature* **2024**, *630*, 841–846. [[CrossRef](#)] [[PubMed](#)]
45. Freeman, L.C. A set of measures of centrality based on betweenness. *Sociometry* **1977**, *40*, 35–41. [[CrossRef](#)]
46. Church, K.W.; Hanks, P. Word association norms, mutual information, and lexicography. *Comput. Linguist.* **1990**, *16*, 22–29.
47. Futrell, R.; Mahowald, K.; Gibson, E. Large-scale evidence of dependency length minimization in 37 languages. *Proc. Natl. Acad. Sci. USA* **2015**, *112*, 10336–10341. [[CrossRef](#)] [[PubMed](#)]
48. Liu, H. Dependency distance as a metric of language comprehension difficulty. *J. Cogn. Sci.* **2008**, *9*, 159–191. [[CrossRef](#)]
49. Gossling, S.; Scott, D.; Hall, C.M. Pandemics, tourism and global change: A rapid assessment of COVID-19. *J. Sustain. Tour.* **2021**, *29*, 1–20. [[CrossRef](#)]
50. Boin, A.; ‘t Hart, P.; Stern, E.; Sundelius, B. *The Politics of Crisis Management: Public Leadership under Pressure*, 2nd ed.; Cambridge University Press: Cambridge, UK, 2016.

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