



Environmental Responsibility and Financial Disclosure: A Green Accounting, CSR Model for Public Sector Tourism

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Abstract

Background: Focusing on Manado, Indonesia, a coastal destination balancing growth and ecological risk, we develop and test an integrative model grounded in stakeholder and legitimacy theories that links environmental management accounting (EMA), CSR commitment, and environmental disclosure quality (EDQ).

Objective: This study examines how green accounting and corporate social responsibility (CSR) jointly advance environmental responsibility and financial disclosure within public-sector tourism governance.

Methods: An explanatory mixed-methods design was employed: survey data from tourism organizations were analyzed using partial least squares structural equation modeling (PLS-SEM) and triangulated through expert interviews and focus group discussions with key stakeholders, including government agencies, hotels, and tour operators.

Results: The results indicate that both EMA and CSR are significant, positive predictors of EDQ, with CSR exerting a marginally stronger effect. Certification status and enterprise type do not significantly moderate these relationships, implying that the EMA-CSR bundle improves transparency across heterogeneous tourism entities. Substantively, embedding EMA metrics into budgeting and decision-making processes, paired with CSR programs that engage communities and regulators, strengthens public financial disclosure and environmental accountability at the destination level.

Conclusion: The study contributes a measurable framework for sustainable tourism governance in emerging regions and offers actionable guidance for policymakers to standardize indicators, require periodic disclosure, and pair certification with assurance and data-quality controls.

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INTRODUCTION

Tourism has become one of the fastest-growing economic sectors worldwide, yet its expansion increasingly collides with planetary boundaries and the public sector's duty to safeguard environmental stewardship. Over the past decade, global debates on climate risk, biodiversity loss, and just transitions have reframed disclosure as a governance instrument rather than a mere communication device, pushing organizations to account for environmental externalities alongside financial results. In tandem, green accounting, particularly environmental management accounting (EMA), and corporate social responsibility (CSR) have moved from peripheral practices to core elements of accountability architectures across service industries, including hospitality and destination management. For coastal destinations in emerging economies, this shift is pivotal: tourism's localized footprints (waste, water, energy, and coastal degradation) interact directly with social legitimacy, fiscal discipline, and policy credibility.

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Consequently, the integration of EMA and CSR within public-sector tourism governance is no longer optional; it is increasingly central to how destinations maintain competitiveness while delivering on the Sustainable Development Goals through transparent, decision-useful disclosure (Font & Lynes, 2018; Gonçalves & Augusto, 2023; Hair et al., 2022).

Empirically, tourism accounts for approximately 8% of global greenhouse gas emissions Gössling (2021), with coastal destinations particularly vulnerable: marine plastic pollution reaches 10 million tons annually, while reef degradation affects over 50% of the world's coral systems (Miller et al., 2023). In Southeast Asia's emerging economies, tourism's environmental footprint remains poorly tracked, with waste generation in destination cities rising 15–20% annually and water stress intensifying in water-scarce regions (Harahap & Suyono, 2021). This empirical urgency underpins the study's focus on integrating measurement (EMA) and commitment (CSR) as mechanisms for translating visibility into accountability.

Despite mounting expectations, three interlocking gaps persist. First, empirical studies often examine CSR or green accounting in isolation, leaving unclear how these instruments jointly shape environmental disclosure quality (EDQ) in tourism governance. Second, the public sector (which sets rules, allocates budgets, and steers destination strategies) remains underexamined compared with large listed firms, even though public disclosure can crowd in private effort and catalyze ecosystem-wide learning. Third, evidence from emerging coastal regions is thin, precisely where governance capacity, fiscal constraints, and environmental exposure intersect most sharply. These gaps create a practice–knowledge disconnect: regulators promote certification and reporting, but the mechanisms through which EMA capabilities and CSR commitments translate into better disclosure, and hence stronger accountability, are insufficiently theorized and tested (Brusca et al., 2018; Kumar, 2025; Wahyuningrum et al., 2025).

Prior research in tourism and hospitality underscores CSR's reputational and performance benefits and documents heterogeneous sustainability reporting practices (Font & Lynes, 2018). Concurrently, the accounting literature links EMA to eco-efficiency, process control, and decision relevance, and highlights the importance of embedding environmental metrics into budgeting and investment appraisal (Hair et al., 2022). Yet cross-fertilization remains limited: tourism studies seldom model EMA as an internal capability that mediates CSR's effect on disclosure, while accounting studies rarely treat destination governance and stakeholder salience as boundary conditions. Emerging evidence in tourism enterprises suggests that ESG/CSR disclosures can reduce risk under uncertainty Kumar (2025) and that regulatory developments (e.g., mandatory reporting) alter disclosure trajectories (Wahyuningrum et al., 2025). Still, robust tests of a joint EMA–CSR model in a public-sector tourism context, and of its invariance across organizational types or certification statuses, are scarce. This paper addresses that *lacuna* by bringing together stakeholder and legitimacy perspectives with a measurement-rigorous PLS-SEM approach to isolate pathways from internal accounting capabilities and CSR commitments to EDQ (Gonçalves & Augusto, 2023; Hair et al., 2022).

This study advances an integrative framework that links EMA, CSR commitment, and environmental disclosure quality (EDQ)—our sole dependent variable—in public-sector tourism governance. We pursue four objectives: (1) to assess the adoption levels of EMA and CSR among tourism organizations operating within a publicly governed destination; (2) to estimate the direct effects of EMA and CSR on EDQ; (3) to examine whether EMA functions as a capability that enhances the realization of CSR-driven disclosure gains; and (4) to test whether certification status or organizational type (e.g., hotel vs. non-hotel) modifies these relationships. Accordingly, we ask: To what extent do EMA and CSR independently and, when integrated, enhance environmental disclosure quality in public-sector tourism? And are these effects stable across organizational and certification strata?

Theoretically, the study responds to calls to operationalize accountability by connecting upstream capability (EMA) and stakeholder commitments (CSR) to downstream disclosure outcomes in a single empirical model tailored to destination governance. Methodologically, it leverages PLS-SEM to accommodate complex latent constructs while retaining the predictive orientation valued in managerial accounting and tourism research. Practically, the findings can inform policy design—for example, pairing certification with minimum quantitative indicators and assurance—and guide public financial management through the integration of environmental

KPIs into budgeting, procurement, and performance contracts. Destination managers, auditors, and hospitality operators stand to benefit from a clearer playbook for institutionalizing transparency that is auditable, comparable, and decision-useful (Font & Lynes, 2018; Gonçalves & Augusto, 2023).

The remainder of the article proceeds as follows. Section 2 synthesizes the literature on CSR, EMA, environmental disclosure, and public-sector sustainability reporting to ground our hypotheses. Section 3 details the research design, measures, sampling, and PLS-SEM estimation strategy. Section 4 presents the empirical results and robustness tests, including invariance checks across certification and organizational type. Section 5 discusses theoretical and policy implications, limitations, and future research avenues. Section 6 concludes with recommendations for embedding EMA-driven metrics and CSR governance into public financial disclosure for sustainable tourism.

Literature Review

Contemporary work on sustainability accounting treats disclosure as a governance mechanism that translates environmental externalities into decision-useful information for stakeholders and budget holders. From a stakeholder–legitimacy perspective, organizations seek a “social license” by demonstrating responsiveness to environmental risks and societal expectations; disclosure quality is therefore an observable outcome of deeper accountability processes (Bebbington & Larrinaga, 2014; Deegan, 2019). In parallel, environmental management accounting (EMA) extends conventional accounting systems to capture material and energy flows, environmental costs, and carbon-intensity metrics that can be embedded in planning, budgeting, and investment appraisal (Schaltegger & Burritt, 2018). The CSR literature complements this by framing transparency as part of a broader commitment architecture—policies, programs, and stakeholder engagement that shape incentives for credible reporting (Carroll & Shabana, 2010). These strands converge in public-sector tourism, where fiscal discipline, public value, and ecological stewardship must be balanced within the same governance system.

EMA's primary contribution in service destinations lies in making environmental performance measurable and auditable at the process level (e.g., water and energy use per guest-night; waste intensity per visitor-day). When such indicators are integrated into budget cycles and procurement, they lower the marginal cost of disclosure and increase verifiability. In public entities, EMA also improves policy coherence by linking operating metrics to programmatic outputs and, ultimately, to Sustainable Development Goal targets. However, adoption remains uneven across emerging destinations: capacity constraints, fragmented data architectures, and limited metering often prevent the regular capture of environmental cost and flow data, constraining disclosure depth and periodicity. The Manado context (coastal, biodiversity-sensitive, and tourism-dependent) highlights the salience of EMA for reef protection, coastal waste management, and energy efficiency.

In tourism, CSR has evolved from philanthropic activities to strategy-aligned programs that touch operations (waste reduction and water conservation), community livelihoods, and visitor education. Empirical studies in hospitality consistently associate CSR with reputational gains and stakeholder trust, while mixed evidence remains regarding its direct performance payoffs. Critically, CSR programs that are metric-rich (targets, baselines, and timelines) tend to be accompanied by stronger disclosure practices because commitments must be demonstrated, not merely stated. In coastal destinations, community co-management and partnerships with conservation bodies create additional disclosure audiences—residents, NGOs, and protected-area authorities—raising the salience of environmental transparency.

EDQ goes beyond the presence of reports. High-quality disclosure is timely, quantified, comparable across periods, boundary-clear (organizational and geographical), balanced (targets and outcomes), and, where feasible, assured. For public-sector tourism, decision-useful EDQ also requires destination-level indicators (e.g., carbon intensity per tourist arrival; waste diverted from landfills; reef-safe compliance) that connect organizational actions to ecosystem outcomes. The Indonesian regulatory setting and sectoral initiatives (e.g., a roadmap for sustainable tourism) are nudging destinations toward more standardized metrics, yet heterogeneity persists (Harahap & Suyono, 2021; Ministry of Tourism and Creative Economy, 2023).

A central gap in prior work is the treatment of EMA and CSR as separate levers, leaving

unclear how they jointly shape EDQ. Conceptually, EMA provides the capability (what and how to measure), while CSR creates commitment pressure and stakeholder touchpoints (why disclosure matters and to whom). When integrated, the EMA–CSR bundle should raise disclosure quality by ensuring that: (i) data exist upstream, (ii) targets are co-created with stakeholders, and (iii) outcomes are reported in a way that is auditable and policy-relevant. Conversely, CSR in the absence of EMA risks symbolic disclosure; EMA without CSR may remain internally oriented and undercommunicated. This complementarity is particularly pertinent in Manado's tourism ecosystem, where environmental externalities (marine plastics, reef stress, and coastal erosion) are highly visible and reputationally sensitive (Gössling, 2021; Tirayoh, 2022).

Destination-level eco-labels and firm-level certifications (e.g., hotel standards) are often assumed to improve disclosure. Evidence from public-sector and tourism settings suggests that certifications tend to raise baselines—codifying minimum practices and documentation—yet do not automatically strengthen the slopes linking EMA/CSR to EDQ if bottlenecks lie in information capability or managerial follow-through. Similarly, while hotel and non-hotel entities differ operationally, the direction of EMA/CSR effects on disclosure may be stable across types when destination governance establishes shared expectations and reporting templates. This informs a pragmatic policy stance: pair certification with minimum quantitative indicators and encourage external assurance to avoid tick-box transparency.

Bringing these strands together, we position EMA as a measurement backbone, CSR as a stakeholder-legitimacy engine, and EDQ as the visible product of their interaction within public-sector tourism governance. The study responds to three persistent gaps: (1) limited tests of a joint EMA–CSR model in public destinations, (2) insufficient clarity on mechanisms linking capabilities and commitments to disclosure quality, and (3) sparse evidence from emerging coastal regions where environmental and fiscal constraints are acute. Using a mixed-method design and PLS-SEM, we estimate the direct effects of EMA and CSR on EDQ and examine whether certification status and organizational type alter these relationships. The expectation, grounded in the literature reviewed, is that EMA and CSR will each positively relate to EDQ, with integration yielding the most policy-useful transparency (Bebbington & Larrinaga, 2014; Carroll & Shabana, 2010; Deegan, 2019; Gössling, 2021; Harahap & Suyono, 2021; Ministry of Tourism and Creative Economy, 2023; Schaltegger & Burritt, 2018).

The foregoing review motivates an operational stance in which EMA supplies the measurement backbone (material and energy flow cost accounting, carbon and waste intensity KPIs, and budget-embedded targets), while CSR provides the commitment architecture (stakeholder engagement, program logic, and stewardship norms). For environmental disclosure quality (EDQ) to be genuinely decision-useful in public-sector tourism, indicators should be (i) routinely metered at source, (ii) budget-linked (baselines, annual targets, and variances), (iii) destination-aggregable (e.g., carbon and waste per tourist arrival), and (iv) progressively assured. In coastal destinations like Manado, this mix aligns transparency with ecosystem stressors (marine plastics, reef health, and water scarcity) while remaining auditable within public financial management cycles. The review thus underpins our empirical test of the joint EMA–CSR model and our expectation of positive, stable effects on EDQ across heterogeneous tourism entities when certification acts mainly as a compliance floor rather than a slope amplifier.

Based on the literature review, we posit the following hypotheses:

1. H1: Environmental management accounting capability (EMA) positively affects environmental disclosure quality (EDQ).
2. H2: Corporate social responsibility commitment (CSR) positively affects environmental disclosure quality (EDQ).
3. H3: The positive effect of CSR on EDQ is stronger when EMA capability is also present (complementarity effect).
4. H4: Certification status does not significantly moderate the EMA→EDQ and CSR→EDQ relationships.

METHOD

This study employed an explanatory mixed-methods design in which a cross-sectional

organizational survey provided the primary evidence, while qualitative work (expert interviews and a stakeholder focus group) was used for instrument refinement and triangulation. The model under test linked environmental management accounting (EMA) and corporate social responsibility (CSR) to environmental disclosure quality (EDQ) within public-sector tourism governance. Certification status (e.g., ISO 14001, PROPER, and GSTC), enterprise type (hotel vs. non-hotel), firm size, and firm age were treated as contextual and control variables. The design was prediction-oriented and tailored to variance-based structural equation modeling to accommodate complex latent constructs and the heterogeneous organizational realities typical of destination ecosystems.

The empirical setting was Manado, Indonesia—an emerging coastal destination where rapid tourism growth intersected with high environmental exposure. The population comprised destination-governance actors and tourism enterprises: (a) public units (municipal tourism office and destination management organization) with budgetary authority and sustainability reporting responsibilities; (b) state- or region-owned operators (public hotels and attractions) with environmental compliance mandates; and (c) private enterprises (hotels/resorts with ≥ 15 rooms, tour operators with ≥ 3 years of operational history, and attraction/restaurant operators with ≥ 50 employees). The inclusion criteria specified organizations with documented environmental footprints (waste generation, energy/water consumption above baseline thresholds, or coastal/marine exposure); sustainability reporting responsibilities (mandated or voluntary); and senior management availability for survey completion. The exclusion criteria were micro-enterprises (< 5 employees), organizations that had been inactive for > 6 months, and organizations without operational facilities in Manado. Using purposive sampling, we targeted 320 organizations; 220 provided complete responses, yielding a 68.75% effective response rate. Data collection (May–October 2025) was conducted through three survey modes: enumerator-assisted delivery for public units and larger hotels ($n = 85$), supervisor-verified self-administered forms for SMEs ($n = 98$), and secure online forms for dispersed operators ($n = 37$). Each response was completed by one informant (senior manager, sustainability officer, or accounting/finance lead) representing the organization. Early–late wave comparisons (first 50 vs. last 50 responses) showed no significant differences in key variables (all $p > .10$), suggesting limited nonresponse bias.

Manado faced acute environmental pressures: annual tourism arrivals exceeded 600,000 visitors (2023–2024), generating approximately 180 tons/day of solid waste, with municipal collection coverage at 72%; coastal waste interception averaged 35 tons/day (2024); coral reef condition was rated “fair to poor,” with 40% live coral cover (vs. a 50% regional average); freshwater aquifers faced a 15% annual drawdown; and seasonal water stress during the dry season affected 25% of hospitality operators. Simultaneously, Indonesia’s mandatory ESG reporting requirements (2025 onward) and the Government’s Sustainable Tourism Roadmap (2023–2030) created regulatory pressure for enhanced environmental disclosure at the destination and organizational levels. This convergence—environmental vulnerability, regulatory momentum, and governance fragmentation—made Manado an appropriate setting for studying how EMA capabilities and CSR commitments translated into disclosure quality.

A structured questionnaire operationalized all latent variables reflectively using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). The instrument sources were as follows: EMA items ($n = 6$) were adapted from Schaltegger & Burritt (2018), de Grosbois (2022), and Kang et al. (2017), capturing material and energy flow tracking, environmental cost identification, integration of environmental KPIs into budgeting and investment appraisal, and carbon, waste, and water accounting. CSR items ($n = 6$) were adapted from Carroll & Shabana (2010), Font & Lynes (2018), and de Grosbois (2022), assessing program breadth and depth, stakeholder engagement intensity, and internal compliance and monitoring routines. EDQ items ($n = 6$) were based on Deegan (2019), emerging public-sector sustainability reporting guidance, and prior tourism disclosure studies, measuring timeliness, quantification, trend comparability, boundary clarity, balance and target orientation, and assurance and accessibility of environmental disclosures. Items were localized into Bahasa Indonesia and back-translated to ensure semantic equivalence. Appendix A provides the complete instrument table, including the indicator code, item statement, construct, and original source for each measure. Content validity was established through an expert review panel comprising three sustainability accounting academics and two

destination practitioners.

A pilot test with 30 organizations examined clarity, variance, and preliminary reliability. Cognitive debriefings informed minor revisions—particularly to EDQ items concerning boundary definitions and assurance—while preserving parsimony. The main survey was administered through three modes: enumerator-assisted delivery for public units and larger hotels, supervisor-verified self-administered forms for SMEs, and a secure online form for dispersed operators. Organizational consent and confidentiality were assured, and one informed respondent represented each unit of analysis. Item-level missingness (<3%) was handled using expectation-maximization; cases with >20% missing data were removed. Outliers identified through leverage and Mahalanobis-distance diagnostics were retained after sensitivity checks confirmed the stability of the results.

Quantitative analyses were conducted in SmartPLS 4 using 5,000 bias-corrected bootstrap resamples. Measurement evaluation comprised internal consistency (Cronbach's alpha and composite reliability), convergent validity (outer loadings and average variance extracted [AVE]), and discriminant validity (heterotrait-monotrait ratio [HTMT] and Fornell-Larcker criterion). Structural evaluation included collinearity checks (VIF), path significance, explained variance (R^2), effect sizes (f^2), and predictive relevance (Q^2 via blindfolding). We estimated the direct paths $EMA \rightarrow EDQ$ and $CSR \rightarrow EDQ$, assessed complementarity by examining whether stronger EMA capabilities enhanced the realization of CSR-driven disclosure gains (via conditional predictions and an interaction robustness probe), and tested measurement invariance across certification status and enterprise type using the MICOM procedure followed by multigroup analysis. Out-of-sample predictive utility was examined using PLSpredict (k-fold cross-validation) against linear benchmarks.

The research sequence followed an explanatory mixed-methods design. In Phase 1 (pilot stage, April 2025), we conducted six preliminary interviews with destination officials and hotel managers to refine the EDQ construct and assess survey-instrument clarity. In Phase 2 (main survey, May–October 2025), 220 organizational surveys were administered, and quantitative analysis was conducted using PLS-SEM (October–November 2025). In Phase 3 (qualitative triangulation, November–December 2025), we conducted 15 in-depth, semistructured interviews and one focus group discussion ($n = 9$ stakeholders) with government officials, hotel executives, tour operators, environmental agencies, and community representatives to contextualize the quantitative findings, explain causal pathways, and identify barriers and enablers to disclosure. Interview and focus group discussion transcripts were coded thematically using a framework covering: (i) data-governance linkages (how EMA capabilities supported disclosure), (ii) CSR-disclosure connections (how commitments translated into transparency), (iii) disclosure audiences and use cases, and (iv) institutional barriers and enablers. Triangulation was conducted through convergence analysis (alignment between quantitative path significance and qualitative themes) and expansion analysis (qualitative themes explaining nonsignificant paths or unexpected results).

RESULTS AND DISCUSSION

Results

The final dataset comprised 220 organizations operating within the Manado destination governance system. Descriptive statistics indicated moderate implementation across constructs (7-point scale): EMA ($M = 3.99$, $SD = 0.90$), CSR ($M = 4.00$, $SD = 0.88$), and EDQ ($M = 4.00$, $SD = 0.86$). The dispersion around the midpoints suggests substantive heterogeneity across entities, justifying structural analysis to explain variance in disclosure outcomes.

Measurement quality was evaluated with attention to the trade-off between parsimony and coverage. Internal consistency was acceptable to high (Cronbach's α /CR: EMA = 0.855/0.890; CSR = 0.842/0.881; EDQ = 0.791/0.851), exceeding the $\alpha = 0.70$ threshold (Hair et al., 2019). Convergent validity was supported for EMA (AVE = 0.536, above 0.50) and CSR (AVE = 0.513, above 0.50); EDQ's AVE was 0.489, marginally below the conventional 0.50 threshold. However, this marginal shortfall is acceptable given that: (1) EDQ's composite reliability (CR = 0.851) exceeds the 0.70 benchmark, indicating that the construct explains meaningful variance despite slightly lower indicator-level convergence; (2) EDQ's theoretical breadth—spanning six distinct

facets of disclosure quality (timeliness, quantification, comparability, boundary clarity, balance, and assurance)—necessitates some heterogeneity in item performance; and (3) sensitivity analysis (excluding the lowest-loading EDQ item; AVE = 0.512 in the alternative specification) confirms that the findings are robust to EDQ specification. Following Guenther et al. (2023), we retained EDQ given its strong CR, theoretical coverage, and predictive relevance ($Q^2 = 0.185$; see Section 4). Outer loadings ranged from 0.70–0.77 (EMA), 0.66–0.74 (CSR), and 0.67–0.72 (EDQ), indicating adequate indicator reliability. Discriminant validity was established (HTMT: EMA–CSR = 0.424; EMA–EDQ = 0.566; CSR–EDQ = 0.628; all < 0.85), confirming construct distinctiveness.

The structural model explained a moderate share of the variance in environmental disclosure quality ($R^2 = 0.370$; adjusted $R^2 = 0.355$), with low collinearity (maximum VIF = 1.25), indicating that the model specification was not compromised by multicollinearity. Both focal paths were positive and statistically significant: EMA → EDQ ($\beta = 0.295$, $t = 3.847$, $p < 0.001$, 95% CI: [0.133, 0.457]) and CSR → EDQ ($\beta = 0.381$, $t = 5.216$, $p < 0.001$, 95% CI: [0.234, 0.528]). To evaluate the magnitude difference between the paths, we conducted a Welch–Satterthwaite t-test (Henseler et al., 2023): $t(df = 1,000) = 2.34$, $p = 0.019$, indicating that the CSR → EDQ coefficient was statistically significantly larger than the EMA → EDQ coefficient (one-tailed test). The effect size for CSR ($f^2 = 0.125$) is classified as small-to-medium, whereas the effect size for EMA ($f^2 = 0.068$) is small. Substantively, stronger environmental management accounting—through material and energy tracking, environmental cost identification, and KPI integration into budgeting—was associated with higher-quality, more transparent disclosure. CSR commitment—through program breadth, stakeholder engagement, and compliance routines—showed a stronger association with EDQ, indicating that social-contract pressures and reputational incentives amplify the publication of quantified, decision-useful environmental information. Predictive relevance (Q^2 via blindfolding) was positive for both focal paths: EMA–EDQ path $Q^2 = 0.186$ and CSR–EDQ path $Q^2 = 0.205$, both > 0 (Cohen, 1988), confirming that the paths have predictive utility beyond sample-level explanation. Control variables were not dominant: size ($\beta = 0.026$, $p = 0.590$) and age ($\beta = -0.009$, $p = 0.326$) were nonsignificant, whereas certification displayed a marginally positive main effect ($\beta = 0.190$, $p = 0.050$), consistent with certification acting as a baseline enabler of documentation and process discipline.

Moderation analyses found no significant slope differences by certification or enterprise type. The interactions for EMA × Certification ($\beta = 0.038$, $p = 0.746$, 95% CI: [−0.187, 0.263]) and CSR × Certification ($\beta = 0.142$, $p = 0.257$, 95% CI: [−0.095, 0.379]) were nonsignificant; similarly, EMA × Hotel ($\beta = -0.035$, $p = 0.765$) and CSR × Hotel ($\beta = 0.067$, $p = 0.585$) did not alter the focal relationships. To visualize these null interactions, conditional effect plots (Aiken & West, 1991) were generated, showing the EMA → EDQ and CSR → EDQ slopes at ± 1 SD from the mean of the moderator. [INSERT FIGURE 1 HERE: Interaction plots for EMA × Certification and EMA × Hotel] [INSERT FIGURE 2 HERE: Interaction plots for CSR × Certification and CSR × Hotel] Simple-slope analysis confirmed that both the EMA → EDQ and CSR → EDQ slopes remained statistically significant and of similar magnitude across certified versus noncertified organizations (EMA | Certified: $\beta = 0.312$, $p < 0.05$; EMA | Noncertified: $\beta = 0.278$, $p < 0.05$) and across hotel versus non-hotel entities (CSR | Hotel: $\beta = 0.395$, $p < 0.001$; CSR | Non-hotel: $\beta = 0.367$, $p < 0.001$). These results imply that the direction and magnitude of the EMA and CSR effects on disclosure are stable across groups: once EMA capabilities and CSR commitments are in place, transparency improves regardless of certification status or whether the entity is a hotel or a non-hotel operator. In practical terms, certification appears to raise the baseline of disclosure quality rather than magnify the incremental gains from EMA or CSR, suggesting that certification mandates should be paired with minimum quantitative indicators and assurance mechanisms to ensure genuine improvement rather than tick-box compliance.

Robustness checks corroborated these patterns. OLS estimates based on standardized composites reproduced the sign and significance of the PLS path coefficients; excluding flagged outliers did not materially change the coefficients. Alternative EDQ specifications (e.g., omitting assurance or timeliness items) yielded comparable results, indicating that the findings were not driven by a single disclosure facet. Diagnostic tests suggested limited common method bias and no detectable endogeneity in the focal regressors. Collectively, the evidence supports the study's core claim: integrating internal measurement capability (EMA) with stakeholder-anchored commitment (CSR) is a reliable route to higher-quality environmental disclosure in public-sector

tourism governance.

Discussion

Overview of findings

This study set out to explain how environmental management accounting (EMA) and corporate social responsibility (CSR) shape environmental disclosure quality (EDQ) in public-sector tourism governance. The structural results show two robust, positive relationships—CSR → EDQ ($\beta = 0.381$, $p < 0.001$) and EMA → EDQ ($\beta = 0.295$, $p < 0.001$)—with a moderate proportion of explained variance ($R^2 \approx 0.37$). Certification has a marginally positive main effect but does not significantly moderate either focal path; nor does enterprise type (hotel vs. non-hotel). Triangulation with interviews and focus group discussions (FGDs) corroborates the quantitative patterns: managers repeatedly pointed to (i) the need for upstream measurement embedded in budgeting and (ii) stakeholder pressures that convert environmental initiatives into public, decision-useful information.

Interpreting the main effects: capability and commitment as complementary levers

The EMA → EDQ effect validates the argument that upstream information capability is a precondition for credible disclosure. Where organizations track material and energy flows, identify environmental costs, and integrate KPIs into budgets and investment appraisal, disclosure becomes low-friction (because the data already exist), verifiable (because they are traceable to metering and ledgers), and policy-relevant (because they are linked to resource allocation). In other words, EMA collapses the distance between operations and reporting, transforming disclosure from a narrative exercise into an auditable output of routine management.

The slightly stronger CSR → EDQ effect suggests that commitment architecture—policies, programs, and stakeholder engagement—amplifies transparency norms and reputational incentives. In a destination economy, CSR programs are visible to multiple audiences (residents, visitors, NGOs, and regulators), raising the salience of quantified outcomes (e.g., waste diverted, water saved, and carbon intensity reduced). Practically, CSR creates the why and to whom of disclosure, while EMA provides the what and how. The combination explains why the two paths are simultaneously significant: organizations that both measure (EMA) and commit (CSR) are structurally more likely to disclose with quality.

Why certification and enterprise type did not moderate the slopes

A common assumption is that environmental certification should strengthen the effects of EMA and CSR on EDQ. Our results indicate otherwise: certification raises the baseline (marginal main effect), but it does not magnify the incremental returns from EMA or CSR. Qualitative probes help explain this finding: certification in the study setting functions largely as compliance infrastructure—codifying minimum practices and documentation—while the binding constraints on high-quality disclosure remain internal (metering coverage, data stewardship, and budget-linked KPIs) and relational (stakeholder engagement routines). Similarly, despite operational heterogeneity, hotels and non-hotel entities face comparable destination-level expectations and templates for disclosure; thus, once EMA and CSR are in place, the direction and magnitude of their effects on EDQ are stable across enterprise types. The policy implication is to pair certification with minimum quantitative indicators and, where feasible, assurance, rather than to expect the label itself to drive slope changes.

Positioning within and contributions to the literature

The study advances three contributions. First, it integrates accounting and tourism governance by demonstrating that EMA (capability) and CSR (commitment) are complementary rather than alternative routes to transparency. Prior work has often treated them in parallel; our model shows that they jointly explain a meaningful share of EDQ variance and are invariant across salient subgroups. Second, by operationalizing EDQ as a multifaceted construct (timeliness, quantification, trend comparability, boundary clarity, balance/targets, and assurance/accessibility) and aligning items with public-sector reporting guidance, the study

moves disclosure research beyond presence/absence toward decision-useful quality. Third, situated evidence from a coastal, emerging-economy destination enriches the geography of knowledge in sustainability accounting and tourism, where most empirical studies remain concentrated in high-income contexts.

Managerial and policy implications

For destination managers and public financial authorities, the findings translate into an actionable blueprint:

1. Embed EMA into the budget cycle. Treat environmental KPIs (e.g., kWh/guest-night, m³ water/guest-night, kg waste/visitor-day, tCO₂e/arrival) as budget-linked targets with monthly metering and variance analysis.
2. Standardize EDQ rubrics. Require quantified, time-series disclosure with clear organizational and geographical boundaries; publish destination-level dashboards that aggregate organization-level KPIs.
3. Couple certification with measurement. Make certification contingent on reporting a minimum indicator set and encourage external assurance for high-impact operators to deter symbolic compliance.
4. Institutionalize CSR as stakeholder contracts. Co-design CSR programs with communities and conservation agencies, and hard-wire reportable outputs (baselines, targets, and timelines) to ensure that commitments translate into disclosable outcomes.
5. Strengthen data governance. Nominate disclosure stewards, invest in metering and material and energy flow cost accounting, and integrate accounting and sustainability teams to reduce reporting friction.
6. Mixed-methods triangulation. To strengthen the integration of quantitative and qualitative strands, the following table maps each significant quantitative path to the qualitative themes that elaborate the underlying mechanisms.

Robustness, triangulation, and alternative explanations

Multiple diagnostics—reliability and validity checks, low multicollinearity, predictive relevance (Q^2), and out-of-sample PLSpredict—support the stability of the results. OLS estimates based on standardized composites reproduce the sign and significance of the PLS path coefficients; excluding flagged outliers and altering EDQ specifications yield comparable patterns. The qualitative strand converges with the quantitative evidence, offering mechanistic narratives (e.g., “data exist → audit-ready disclosure”) that help rule out purely symbolic explanations. While unobserved institutional factors could influence both EMA/CSR and EDQ, copula tests did not suggest endogeneity bias in the focal paths.

CONCLUSION

This study demonstrates that environmental management accounting (EMA) capability and corporate social responsibility (CSR) commitment are important and complementary drivers of environmental disclosure quality (EDQ) in public-sector tourism governance. The structural model explained 37% of the variance in EDQ, while both EMA and CSR had significant positive effects on EDQ (EMA: $\beta = 0.295$, $p < 0.001$; CSR: $\beta = 0.381$, $p < 0.001$). CSR exhibited a significantly stronger association with EDQ than EMA, emphasizing the importance of stakeholder-oriented commitment alongside internal environmental measurement capability. Moreover, certification status and enterprise type did not significantly moderate these relationships, indicating that the positive effects of EMA and CSR remain consistent across the organizational categories examined. The qualitative findings from 15 interviews and one focus group discussion further supported these results by showing that reliable internal measurement and meaningful stakeholder engagement jointly contribute to timely, quantitative, auditable, and decision-useful environmental disclosure.

These findings position environmental disclosure as a core governance function that connects environmental stewardship, fiscal credibility, accountability, and destination competitiveness. Accordingly, destination governance bodies and public financial authorities should integrate EMA into budgetary processes, regularly monitor environmental performance

indicators, establish standardized EDQ criteria, complement certification with minimum quantitative disclosure requirements, institutionalize stakeholder participation in CSR initiatives, and strengthen environmental data governance. Nevertheless, the findings should be interpreted within the specific context and organizational classifications examined in this study. Future research may test the proposed relationships in different tourism destinations and institutional settings, employ longitudinal designs to examine changes over time, and investigate additional organizational or governance factors that may explain the remaining variance in environmental disclosure quality.

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AUTHOR CONTRIBUTION STATEMENT

Victorina Z. Tirayoh, Herman Karamoy, and Christian V. Datu contributed to the conceptualization, methodology, investigation, data interpretation, and preparation of the manuscript. All authors critically revised the manuscript, approved the final version, and agreed to be accountable for the integrity of the work.

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