

Green Practices and Sustainability Governance In Higher Education: Evidence from NAAC Criterion-7

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Abstract

Sustainability in higher education increasingly relies on the clarity with which enacted practices and codified procedures communicate credible governance signals. India's NAAC (National Assessment and Accreditation Council) Criterion-7 offers publicly accessible, comparable evidence of such practices across various colleges.

The objective of this study is to determine whether institutional green practices and procedural maturity, as documented in NAAC Criterion-7 records, are associated with the level of sustainability governance, as reflected in environment and energy audits (7.1.6).

A quantitative, cross-sectional research design utilising secondary institutional-level data was employed. Four indicators were operationalised from NAAC AQAR/SSR documents using ordinal coding (A = 4, B = 3, C = 2, D = 1): Green Campus (7.1.5.), Alternate Energy (7.1.2.), Water Conservation (7.1.4), and Environment/Energy Audits (7.1.6)

The presence of an e-waste Standard Operating Procedure (SOP) was captured through a binary proxy. The analysis incorporated descriptive statistics, Pearson and Spearman correlation coefficients, and Ordinary Least Squares (OLS) regression predicting 7.1.6. Among twenty colleges (N = 15 after listwise deletion), the breadth of Green Campus practices demonstrated the most substantial partial effect on audit outcomes, followed by the presence of an e-waste SOP. Alternate Energy showed a positive association but was not statistically significant after controlling for other variables. Water Conservation exhibited a slight, non-significant, negative partial coefficient, likely attributable to predictor overlap. The model demonstrated a high degree of fit ($R^2 \approx 0.94$).

These findings suggest that visible, campus-wide practices and formalised e-waste procedures are the most evident institutional levers for enhanced sustainability governance, as indicated by audit intensity. The methodology provides a transparent, replicable baseline for benchmarking. Actionable priorities include formalising e-waste SOPs, deepening routine Green Campus practices, and demonstrating energy investments through capacity, coverage, and monitoring metrics. Future research should aim to expand the sample across additional states and over multiple years.

Keywords: NAAC Criterion-7; sustainable campus culture; Green Campus initiatives; e-waste SOP; environment/energy audits; higher education governance; alternate energy; water conservation.

1. INTRODUCTION

Higher education institutions (HEIs) are crucial for advancing environmental sustainability. As large

organisations that train future professionals and serve as community hubs, their daily operations—such as energy use, water management, waste disposal, transportation, procurement, landscaping, and laboratory activities—significantly impact environmental outcomes. These activities also serve as positive examples for students and staff. 'Green practices' involve structural changes, including adopting renewable energy and energy-efficient lighting, as well as routine actions like waste separation, e-waste management, eco-friendly purchasing, and reducing paper usage. Moreover, many curricular and co-curricular programmes promote integrating sustainability into campus life.

Achieving these environmental goals requires strong sustainability governance. This involves establishing clear policies, setting specific targets and budgets, defining responsibilities across departments, and implementing mechanisms to monitor and report progress, such as dashboards and audits. It also includes continuous improvement cycles that link data collection with tangible actions. Effective governance guarantees that sustainability initiatives are incorporated into comprehensive programmes with clear ownership, deadlines, and transparent documentation. In well-structured systems, processes such as environmental audits, compliance checks, and external certifications serve as reliable indicators of progress and motivate ongoing improvement.

Despite rising enthusiasm for sustainability, higher education institutions (HEIs) often face challenges such as securing funding for long-term upgrades, coordinating efforts across departments, ensuring accurate data, and maintaining behavioural changes beyond pilot projects. Good governance tackles these issues by prioritising initiatives with tangible benefits, streamlining procedures like standard operating protocols for e-waste and vendor agreements, and making decisions based on solid evidence.

This study examines how green initiatives and procedural maturity impact the effectiveness of sustainability governance in HEIs. By analysing visible indicators such as infrastructure projects, campus-wide programmes, and audit activities, we provide a practical and repeatable framework for monitoring progress and creating an environment where environmentally friendly behaviours thrive among the campus community. Higher education institutions in India play a vital role in the country's sustainability efforts—not only as sources of knowledge but also as public exemplars, whose daily operations demonstrate environmental priorities to students, staff, and local communities. In this context, well-documented campus practices, such as adopting alternative energy sources, water conservation measures, and routine environmental audits, serve as key indicators for observing and assessing a 'sustainable campus culture.'

2. Theoretical Framework

Green HRM and Employee Green Behaviour

The conceptual framework serves as a comprehensive overview of the interplay between Green Human Resource Management (Green HRM) practices and Employee Green Behaviour (EGB), ultimately shaping a Sustainable Campus Culture in Governance of Higher Education Institutions

A. Key Components of the Framework:

- **Green HRM Practices:** These include recruitment strategies focused on environmental competencies, training and development that emphasize eco-friendly practices, performance management that rewards sustainable behaviors, and employee involvement programs that encourage participation in green initiatives. Such practices are designed to integrate environmental considerations into all facets of HR management.
- **Employee Green Behaviour (EGB):** EGB refers to employees' actions that contribute to environmental

sustainability, both within the workplace and in their personal lives. This includes energy conservation, waste reduction, and active participation in sustainability initiatives. The framework posits that effective Green HRM practices lead to increased EGB among employees.

- Sustainable Campus Culture: This is characterised by a shared commitment to sustainability among all stakeholders in the campus community. A sustainable campus culture promotes environmental awareness, encourages sustainable practices, and fosters an overall ethos of environmental responsibility.
- B. Mediators: Mediators are variables that explain *how or why* Green HRM practices influenced. 1. Employee Green Behaviour (EGB).
- C. Green Organisational Climate: Green Organizational Climate: This refers to the shared perceptions among employees regarding the organization's commitment to environmental practices. A positive Green Organizational Climate can enhance the impact of Green HRM practices on EGB, as it creates an environment where sustainability is valued and encouraged.
- 3. Environmental Commitment:
 - D. The intrinsic motivation of employees to engage in eco-friendly behaviours is influenced by their personal values and the organisational culture. Enhanced environmental commitment serves as a mediator, strengthening the link between Green HRM initiatives and the likelihood of EGB.
 - E. C. Moderators: Influence the relationship between Green HRM practices and Employee Green Behaviour, including leadership support and resource availability.
 - Leadership Support: Leadership is crucial in fostering a green culture. Leaders who demonstrate a strong commitment to sustainability can amplify the effectiveness of Green HRM practices, ensuring that EGB is prioritised at all levels of the organisation.
 - Resource Availability: The availability of resources (financial, technological, and human) plays a crucial role in enabling employees to engage in green behaviours. Organisations that invest in sustainable technologies and provide adequate resources can bolster the effectiveness of Green HRM practices, ultimately enhancing EGB.
- F. **GHRM APPROACHES** The following holistic approach provides valuable insights for organisations seeking to enhance their environmental sustainability initiatives.
 - Feedback Mechanisms: Implementing regular feedback systems to assess EGB and employee perceptions of Green HRM practices can help organisations identify areas of improvement and reinforce successful initiatives.
 - Societal and Community Influence: Surrounding societal and community norms can influence both EGB and Green HRM practices, shaping how organisational practices are perceived and adopted by employees.
 - Cross-functional Teams: Creating interdisciplinary teams focused on sustainability can enhance collaboration and innovation, further embed green practices into organisational culture, and increase EGB.
 - Impact Assessment and Metrics: Establishing clear metrics to evaluate the impact of Green HRM practices on EGB and overall sustainability performance can guide continuous improvement efforts.

Conceptual Framework

Although much of the international literature discusses sustainability in universities through people-centred concepts such as Green Human Resource Management (Green HRM) and Employee Green

Behaviour (EGB), reliable large-scale measurement is often hampered by issues such as survey accessibility, response bias, and resource constraints.

India's National Assessment and Accreditation Council (NAAC) provides a practical alternative. Its Criterion-7 requires colleges to publish evidence of their environmental initiatives, including 7.1.2 (Alternate Energy), 7.1.4 (Water Conservation), 7.1.5 (Green Campus Initiatives), and 7.1.6 (Environment/Energy Audits). These publicly accessible records facilitate transparent comparisons of practices and governance across institutions.

Clarifier (interpretation at the institution level): NAAC 7.1.5 (Green Campus), 7.1.2 (Alternate Energy), 7.1.4 (Water), and the e-waste SOP proxy are used as enacted practices, infrastructure, and governance, collectively reflecting conditions conducive to EGB—evidenced by stronger Environment/Energy audits (7.1.6).

Constructs and operationalisation include:

- Drivers: Green Campus Initiatives (7.1.5; A–D coded, with A=4 and D=1), Alternate Energy (7.1.2; A–D coded), Water Conservation (7.1.4; A–D coded).
- Procedural Maturity: e-waste SOP (binary proxy) indicating codified disposal and vendor processes.
- Outcome: Environment/Energy Audits (7.1.6; A–D coded) as the dependent variable and the institutional assurance signal of a maturing sustainable campus culture.

The link to EGB is not directly observed; it is posited that stronger practices, infrastructure, and procedures facilitate and normalise EGB, as reflected in higher 7.1.6 audit scores.

For this study, NAAC records at the institutional level (Criterion-7) are observable proxies for factors promoting EGB, rather than directly surveying employees. Additionally, we develop a binary indicator for e-waste SOP based on AQAR/SSR narratives to assess procedural maturity. Collectively, these indicators represent infrastructure, routines, and compliance mechanisms that influence the propensity for green behaviours on campus. The impact of these measures is illustrated by the frequency of environment and energy audits (7.1.6).

Problem Statement

India currently lacks comprehensive, verifiable institutional metrics to assess the correlation between environmentally sustainable practices and governance frameworks. This study aims to bridge that gap by utilising NAAC Criterion-7 documentation to assess institutional green initiatives and analyse their connection to the extent and depth of environmental and energy audits.

Research Rationale

NAAC AQAR/SSR records serve as a transparent and citable foundation for comparing green practices across institutions. Utilising these records as proxies lowers respondent burden, reduces common-method bias, and improves replicability. The analysis provides a valuable baseline for benchmarking and expanding to more institutions and years.

Objectives of the Study

- Operationalise NAAC criteria 7.1.2 (Alternate Energy), 7.1.4 (Water), 7.1.5 (Green Campus), and 7.1.6 (Environment/Energy Audits), and create an e-waste SOP governance proxy based on AQAR/SSR narratives.
- Analyse patterns in indicator performance and audit frequency across twenty colleges in Andhra

Pradesh.

- Employ correlations and Ordinary Least Squares (OLS) regression to evaluate relationships and depict the influence of standardised partial factors.
- Provide practical recommendations for enhancing sustainable practices and governance on campus.

Research Design

1. Overview and Level of Analysis

This study uses a quantitative, cross-sectional, secondary data design at the institutional level. The unit of analysis is the college (N = 20 Government Colleges in Andhra Pradesh, India).

2. Data Sources

Data is obtained exclusively from public administrative documents issued for quality assurance by the National Assessment and Accreditation Council (NAAC):

- Annual Quality Assurance Report (AQAR) – yearly self-assessment on quality initiatives and results.
- Self-Study Report (SSR) – detailed narrative and supporting evidence prepared for NAAC accreditation cycles.

All data are sourced from the Criterion 7: Institutional Values and Best Practices section of AQAR/SSR documents that are openly accessible on official college or NAAC websites.

3. Sampling and Inclusion

- Frame: Government colleges in Andhra Pradesh with publicly available AQAR/SSR (latest available year/cycle).
- Inclusion: Presence of usable entries for Criterion-7 indicators and/or verifiable narrative evidence for governance procedures.
- Final sample: 20 institutions meeting the above criteria.

Variables and Operationalisation: Operationalised four NAAC indicators using a uniform ordinal coding scheme and added one governance proxy from narratives:

1. NAAC 7.1.5 – Green Campus Initiatives → coded A = 4, B = 3, C = 2, D = 1.
2. NAAC 7.1.2 – Alternate Energy Initiatives → coded A = 4, B = 3, C = 2, D = 1.
3. NAAC 7.1.4 – Water Conservation Measures → coded A = 4, B = 3, C = 2, D = 1.
4. NAAC 7.1.6 – Environment/Energy Audits (outcome variable) → coded A = 4, B = 3, C = 2, D = 1.
5. e-waste Standard Operating Procedure (SOP) proxy → binary (1 = explicit SOP/vendor MoU documented; 0 = otherwise), derived from AQAR/SSR narrative evidence.

Rationale: These indicators and the e-waste SOP proxy are treated as observable institutional conditions that enable green practices and governance. 7.1.6 (audits) is interpreted as a sustainability governance intensity signal.

Data Preparation and Quality Checks

- Harmonisation: Standardised college names, years, and indicator labels; resolved minor formatting differences across reports.
- Verification: Each row has a verified source URL in the annex; where applicable, corroborated against annexures/DVV clarifications.
- Missing data: Marked as “N/A” and excluded pairwise in correlations and listwise in regression to preserve interpretability.

- Consistency: Applied a single A→D to 4→1 mapping across all three driver indicators and the audit outcome.

Statistical Analysis Plan

Analyses were carried out in Python 3.11 (Anaconda) with pandas 2.x, NumPy 1.26 for descriptive statistics and data handling, statsmodels 0.14 for OLS and robust standard errors, SciPy 1.11 for correlations, and matplotlib 3.8 for plotting, all within JupyterLab 4. x. Data curation and appendix tables were created in Microsoft Excel 365. All analyses utilised standard statistical software.

1. Descriptive statistics

- For all variables: count, mean, standard deviation, minimum, maximum; for binaries: proportion (0–1).

2. Bivariate associations

- Pearson product–moment correlation (assumes approximate interval scale for the 4–1 codes) to gauge linear associations.
- Spearman rank-order correlation (non-parametric) as a robustness check for the ordinal nature and potential non-linearity.

3. Regression model

- Ordinary Least Squares (OLS) regression to estimate partial effects of predictors on audits: Audit Score (7.1.6)= $\beta_0+\beta_1(7.1.5)+\beta_2(7.1.2)+\beta_3(7.1.4)+\beta_4(\text{e-waste SOP})+\epsilon$
- Reporting: Unstandardized coefficients (β), standard errors (SE), t-statistics, p-values, R^2 , and N.
- Diagnostics (good practice):
- Multicollinearity: check Variance Inflation Factors (VIF).
- Heteroskedasticity: use heteroskedasticity-robust (HC) SEs if residual variance is non-constant.
- Influence: inspect Cook's distance given small N.
- Visualization: A journal-neutral figure of standardized betas (and 95% CIs where applicable) to compare relative partial effects.

Assumptions and Scope

- Linearity & additivity: Relationships between predictors and audit score are approximately linear and additive.
- Independence: Each college is an independent observational unit.
- Measurement level: The 4–1 codes approximate ordered categories; results are interpreted cautiously and corroborated with Spearman ρ .
- Causal caution: Cross-sectional secondary data support associational (not causal) inference.

Ethics and Compliance

- Data type: Public administrative documents (AQAR/SSR); no human participants or personal data.
- Ethics review: Institutional review typically not required; an ethics exemption note can be provided on request.
- Transparency & reproducibility: Dataset with coding rules and verified source links accompanies the manuscript for replication.

Review of Literature

Green Human Resource Management (Green HRM)

1. Green HRM embeds environmental objectives across HR functions (recruitment, training, appraisal, rewards) and is consistently linked to pro-environmental outcomes. Recent syntheses show the field has matured from descriptive accounts to tested mechanisms and boundary conditions (Miah et al., 2024; Zacher & Guo, 2023).
2. Contemporary studies report that green training, appraisal, and recognition reliably predict employee green outcomes across sectors and geographies (Veerasamy & Shankar, 2024; Zhang et al., 2024).
3. Newer work also emphasises green organisational culture as a proximal lever through which GHRM translates into behaviour (Bangwal et al., 2025; Gao et al., 2025).

Employee Green Behaviour (EGB)

4. EGB captures task-related, voluntary, and innovative eco-actions at work. Meta- and narrative reviews document robust associations between organisational practices and EGB, especially when employees perceive supportive climates and leadership (Ali et al., 2024; Zacher & Guo, 2023).
5. Recent empirical studies show that organisational support and green HR systems foster daily conservation behaviours and discretionary initiative (Zhang et al., 2024).
6. Evidence from higher-education contexts—though still limited—suggests similar dynamics, with faculty EGB improving operational sustainability and wellbeing (Mahesh & Ercantan, 2023).
4. Mediating Mechanisms: Green Organisational Climate & Environmental Commitment
7. Green organizational climate—shared perceptions that sustainability is expected and supported—consistently mediates the GHRM → EGB path (Rubel & Kee, 2021).
8. Employee environmental commitment also acts as a psychological mechanism linking HR practices to behavior (Pham et al., 2019; Miah et al., 2024).
5. These mediators align with social exchange and AMO logics: employees reciprocate supportive systems and have the ability, motivation, and opportunity to act in green ways.
6. Moderating Conditions: Leadership Support & Resource Availability
9. Leadership support for sustainability has been identified as a crucial enabler of green practices. A meta-analysis confirmed that positive leadership styles significantly boost pro-environmental behaviours (He et al., 2024).
10. Multi-wave studies show that responsible or environmentally specific leadership enhances EGB via motivational pathways (Zhou et al., 2022; Zafar et al., 2022).
11. Resource availability (time, budget, facilities) is repeatedly noted as a necessary condition—without it, motivated employees may be unable to enact green intentions (Miah et al., 2024).

Hypotheses

- H1: Higher Green Campus (7.1.5) is associated with higher Environment/Energy Audits (7.1.6).
- H2: Higher Alternate Energy (7.1.2) is associated with higher Environment/Energy Audits (7.1.6).
- H3: Higher Water Conservation (7.1.4) is associated with higher Environment/Energy Audits (7.1.6).
- H4: Presence of an e-waste SOP is associated with higher Environment/Energy Audits (7.1.6).

Data Analysis

Table 1. Descriptive statistics for NAAC-based sustainability indicators (N = 19).

Variable	count	mean	std	min	25%	50%	75%	max
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Alt_Energy_Score	17.0	2.29	0.69	1.0	2.0	2.0	3.0	4.0
Water_Score	18.0	2.61	0.61	2.0	2.0	3.0	3.0	4.0
Green_Campus_Score	16.0	3.5	0.63	2.0	3.0	4.0	4.0	4.0
Env_Audit_Score	18.0	2.61	0.98	1.0	2.0	2.5	3.0	4.0
Has_Solar_or_LED_Proxy	18.0	0.89	0.32	0.0	1.0	1.0	1.0	1.0
Has_RWH_or_Recycling_Proxy	19.0	0.95	0.23	0.0	1.0	1.0	1.0	1.0
Has_EWaste_SOP	19.0	0.26	0.45	0.0	0.0	0.0	0.5	1.0
Has_Green_Award	16.0	0.06	0.25	0.0	0.0	0.0	0.0	1.0

Data Coverage:

Overall, N is 19, but per-variable counts range from 16 to 19. Some colleges lacked a value for specific indicators (e.g., Green_Campus_Score has 16).

Discussion

Alt_Energy_Score

- Institutions generally cluster around C to low B (median = 2).
- Range: Fairly dispersed (sd≈69), with scores from 1 to 4; a few colleges are at A/B, but many remain at C.
- Implication: Adoption of alternate energy and efficiency upgrades is uneven, indicating potential to expand beyond pilot projects.

Water_Score

- Many colleges fall into the B range (median = 3).
- Distribution is tight (0.61), with most institutions scoring between 2 and 3.
- Implication: Water conservation efforts (such as RWH and recycling) are more developed than overall energy practices but are still not consistently high.

Green_Campus_Score:

- Performance is strong, with median and 75 th percentile both at 4 (A).
- Ceiling: Many colleges report A- level green initiatives like plantation drives, plastic- free zones, and mobility policies.
- Implication: Campus- wide green routines are well documented; this score may be nearing its maximum for several colleges.
- Env_Audit_Score (mean 2.61; sd 0.98; n = 18; Q 1 = 2, Median≈2.5, Q 3 = 3)
- The score falls between C and B-, with the widest spread (sd≈0.98).
- Range 1–4: some colleges have no or limited audits (D), while others achieve A.
- Implication: Governance and assurance practices vary considerably; audits are a common bottleneck despite better practices elsewhere.
- Binary proxies (average proportions)
- Has_Solar_or_LED_Proxy (mean 0.89; n = 18)
- About 89% of colleges adopt solar or LED lighting.
- Implication: Basic energy- efficient measures are widespread, but this doesn't necessarily mean a high Alt_Energy_Score, which also considers capacity, coverage, and documentation.
- Has_RWH_or_Recycling_Proxy (mean 0.95; n = 19)
- Nearly 95% employ rainwater harvesting or recycling.

- Implication: Infrastructure levels are quite high, aligning roughly with Water _ Score scores between 2. 2.6 and 3. 3.0. However, depth and maintenance could limit progress toward a consistent A.
- Has _ E waste _ SOP (mean 0. 26; n = 19)
- Only 26% have a formal e- waste procedure or vendor MoU.
- Implication: Procedural maturity is lacking; this correlates with lower or mixed Env _ Audit _ Score, as audits usually follow documented procedures.
- Has _ Green _ Award (mean 0. 06; n = 16)
- Only 6% have received external green awards or certifications.
- Implication: External recognition is rare; it is a useful but non-essential indicator of governance quality.

Table 2. Pearson correlation matrix among key indicators.

Variable	Alt_Energy_Score	Water_Score	Green_Campus_Score	Env_Audit_Score	Has_Solar_or_LED_Proxy	Has_RWH_or_Recycling_Proxy	Has_EWaste_SOP	Has_Green_Award
Alt_Energy_Score	1.0	0.6	0.66	0.54	0.49	nan	-0.09	-0.1
Water_Score	0.6	1.0	0.51	0.32	0.25	nan	-0.22	-0.26
Green_Campus_Score	0.66	0.51	1.0	0.6	0.63	nan	0.11	nan
Env_Audit_Score	0.54	0.32	0.6	1.0	0.2	nan	0.51	-0.51
Has_Solar_or_LED_Proxy	0.49	0.25	0.63	0.2	1.0	0.69	-0.18	0.1
Has_RWH_or_Recycling_Proxy	nan	nan	Nan	nan	0.69	1.0	0.14	0.07
Has_EWaste_SOP	-0.09	-0.22	0.11	0.51	-0.18	0.14	1.0	-0.12
Has_Green_Award	-0.1	-0.26	Nan	-0.51	0.1	0.07	-0.12	1.0

Note: NAN is not a number

Discussion:

Associations with the outcome (Env_Audit_Score)

- Green_Campus_Score → Env_Audit_Score: $r = .60$ (large, +)
Campuses reporting broader green-campus practices also report more intensive audits. This aligns with the theory that visible routines and norms (7.1.5) are associated with stronger governance/assurance.

- **Alt_Energy_Score** → **Env_Audit_Score:** $r = .54$ (large, +)
Greater alternative-energy actions co-move with audit intensity—consistent with tangible investments that enable stronger governance signals.
- **Has_EWaste_SOP** → **Env_Audit_Score:** $r = .51$ (large, +)
Having a formal e-waste SOP or vendor process is closely associated with successful audits. This is a practical advantage: documented procedures are easier to review during audits.”
- **Water_Score** → **Env_Audit_Score:** $r = .32$ (medium, +)
Positive but less pronounced. Since most institutions already have RWH/recycling, the variation between colleges is smaller, resulting in a weaker signal.
- **Has_Solar_or_LED_Proxy** → **Env_Audit_Score:** $r = .20$ (small, +)
Presence alone (yes/no) is too crude; the scored indicators (capacity/coverage/quality) provide more meaningful information than a simple proxy..
- **Has_Green_Award** → **Env_Audit_Score:** $r = -.51$ (large, -)
This probably results from limited data (only about 6% have awards) and small sample size; avoid over-interpreting it. Awards are uncommon and not a factor in the design.

The correlation matrix indicates that environment/energy audit intensity (7.1.6) is strongly and positively associated with Green Campus initiatives ($r = .60$), Alternate Energy actions ($r = .54$), and the presence of a formal e-waste SOP ($r = .51$), with a smaller positive association for Water Conservation ($r = .32$). Predictors co-vary as expected (e.g., Green Campus with Alternate Energy, $r = .66$), suggesting some shared variance; accordingly, we rely on OLS to examine partial effects. Correlations with the rainwater-harvesting proxy are not computed due to near-constant values (~95% ‘yes’). Overall patterns support the proposition that visible practices, tangible energy investments, and codified procedures align with stronger sustainability governance signals.

Table 3. OLS regression predicting Environment/Energy Audit Score (7.1.6). Model N = 15; R² = 0.94. Dependent variable: Env_Audit_Score.

Variable	Coef.	Std. Err.	t	p> t
Const	-0.429	0.4	-1.07	0.309
Green_Campus_Score	0.884	0.141	6.26	0.0
Alt_Energy_Score	0.198	0.13	1.53	0.158
Water_Score	-0.244	0.157	-1.55	0.151
Has_EWaste_SOP	0.794	0.14	5.68	0.0

Notes: Coefficients from OLS with constant. If p-values are blank, a lightweight OLS was used due to package limits; otherwise, robust estimates include standard errors, t-statistics, and p-values. Constant: $\beta = -0.429$ (ns), Not substantively meaningful; it is the model intercept when all predictors equal zero (off-scale for 1–4 codes)

Findings of Table 3:

- **Green_Campus_Score:** $\beta = 0.884$, $p < .001$ (highly significant, +) For each one-level increase on the Green-Campus scale (e.g., from C=2 to B=3), the audit score rises by approximately 0.88 points on a 1–4 scale, on average. This represents a substantial partial effect and is the most powerful predictor.
- Colleges with an e-waste SOP/vendor process score approximately 0.79 points higher on audits

compared to those without, all other factors held constant. This represents a substantial and actionable governance lever.

- **Alt_Energy_Score:** $\beta = 0.198$, $p = .158$ (ns, +). While positively related, this is not statistically significant after accounting for other indicators. Interpretation: Actions related to alternate energy are associated with audits; however, their influence largely overlaps with Green-Campus breadth and the SOP variable. In essence, energy investments contribute, but their distinct impact is limited in this model.
- **Water_Score:** $\beta = -0.244$, $p = .151$ (not significant). Shows a slight negative partial coefficient. In bivariate analysis, water was positively correlated with audits; the negative sign in this context is probably due to suppression or overlap effects caused by collinearity with Green-Campus and Energy, both having correlations around $r \approx .6$ with Water. Do not over-interpret the negative sign.

The OLS model explains 94% of the variation in environment/energy audit scores ($N = 15$). Green Campus initiatives exhibit the largest and most robust partial effect ($\beta = 0.884$, $p < .001$), followed by the presence of a formal e-waste SOP ($\beta = 0.794$, $p < .001$). Alternate Energy is positive but not significant when considered alongside these variables ($\beta = 0.198$, $p = .158$), and Water shows a small, non-significant negative partial coefficient ($\beta = -0.244$, $p = .151$), likely reflecting overlap among predictors. Overall, the breadth of campus-wide green practices and codified procedures is the clearest institutional enabler of stronger sustainability governance signals, as captured by audit intensity.

Result

H1 is supported: Green Campus breadth shows a large positive correlation with audit intensity and remains highly significant in the OLS model.

H2 is partially supported: Alternate Energy correlates positively with audits, but its unique effect is not statistically significant once Green Campus and e-waste SOP are included.

H3 is inconclusive: Water shows a slight positive correlation with audits, but the OLS coefficient is non-significant (and negative) after adjusting for other predictors, likely reflecting overlap among indicators.

H4 is supported: Documented e-waste procedures (SOP/MoU) are strongly and positively associated with audits in both the correlation and OLS analyses.

Limitation:

- The utilisation of institution-level proxies and the modest sample size ($N=20$, representing one state) may limit generalizability and the precision of effect estimates—particularly concerning rare recognitions (awards).
- Nonetheless, the approach remains reproducible, citable, and scalable to additional institutions and states, thereby providing a practical baseline for benchmarking and longitudinal monitoring of sustainable campus culture.

Suggestions

- **Do First:** Draft, notify, and implement an **e-waste SOP** with a vendor MoU; keep **pickup logs** and attach them to AQAR/SSR.
- **Deepen:** Move Green-Campus from “events” to **routinized, evidenced practices** (schedules, attendance, outcomes, geo-tagged photos, corrective-action logs).

- **Refine energy evidence:** Shift from “has solar/LED” to **capacity, coverage, and monitoring** (kW, %LED, sensors, EMS dashboards) to strengthen audit readiness.
- **Sustain water practices:** Maintain systems and document **measurable outputs** (RWH volumes, reuse rates) to avoid plateauing.

Conclusion

Analysing 20 Andhra Pradesh Government Colleges, the various indicators and their relationship to audit intensity through statistical methods, correlation analysis, and OLS regression, complemented by a standardised. The results show that colleges with comprehensive Green Campus programmes, strong alternative energy initiatives, and documented e-waste management procedures tend to undergo more extensive audits. Higher audit intensity indicates better governance and a commitment to creating a sustainable campus environment. This study offers an accessible and reliable approach to evaluating sustainability using publicly available data, providing practical insights aligned with SDGS and establishing a baseline for benchmarking and monitoring Indian colleges.

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