

Donor-Driven Environmental Governance, Symbolic Compliance, and Monitoring Gaps in Humanitarian Operations: Quantitative Evidence from INGOs in Pakistan

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Abstract

This study examines environmental governance in humanitarian operations in Pakistan, focusing on donor-driven compliance, monitoring gaps, and institutional enforcement. Using a cross-sectional quantitative design, data were collected through a structured survey of 41 respondents across 12 international NGOs, covering policy institutionalisation, monitoring systems, donor conditionality, and technological adoption. Descriptive statistics, chi-square tests, Spearman correlation, and regression analysis were applied to assess governance patterns and compliance drivers. Findings show that while 41.5% of organisations report formal environmental policies, 58.5% demonstrate weak or absent enforcement, indicating symbolic compliance. Monitoring systems are underdeveloped, with 53.7% lacking formal environmental impact assessment and 36.6% tracking no sustainability KPIs. Donor conditionality emerges as the strongest predictor of compliance, particularly where funding penalties exist, while domestic legal frameworks remain weakly embedded. AI adoption is limited but positively associated with long-term compliance. The study concludes that environmental governance is externally driven rather than institutionally embedded. It recommends strengthening internal compliance units, formalising KPI-based monitoring, harmonising donor frameworks, enforcing subcontractor accountability, and investing in digital monitoring tools. These measures are necessary to shift from procedural compliance to operational environmental governance.

1.0 Introduction

Why Environmental Governance in Humanitarian Operations Matters

Humanitarian operations are designed to save lives, but they also produce environmental pressure (Château and Mavroëidi, 2023). Relief logistics depend on aviation, diesel transport, temporary shelters, generators, and rapid procurement systems (Global Logistics Cluster, 2021). These activities increase emissions and waste in fragile environments (Parker, 2021; Corbett et al., 2022). Environmental impact in humanitarian response is therefore not only a technical issue of efficiency. It is a governance issue shaped by institutional rules, coordination systems, and monitoring mechanisms (Besiou et al., 2021). Where monitoring is weak, environmental costs remain unrecorded and unmanaged. This issue becomes more serious in climate-vulnerable contexts such as Pakistan. The 2022 floods caused damages exceeding USD 30 billion and triggered large-scale emergency mobilisation (World Bank, 2022). Post-disaster operations increase debris waste, supply-chain emissions, and pressure on local ecosystems, especially when environmental screening is limited (UNEP/OCHA, 2010). At the same time, Pakistan's environmental governance system faces coordination and enforcement gaps, which reduce regulatory strength (Syed et al., 2024). Although many humanitarian organisations endorse voluntary environmental commitments, enforcement often depends on reporting systems rather than binding regulation (ICRC and IFRC, 2021). This creates a risk of symbolic compliance, where policies exist but practice remains inconsistent (DiMaggio & Powell, 1983). Therefore, the critical question is not whether environmental policies are adopted, but whether they are institutionally enforced and empirically monitored.

1.2 Pakistan Governance Context: Domestic Law Exists, But Enforcement Is Weak

Pakistan possesses a formal environmental governance framework on paper. The Pakistan Environmental Protection Act 1997 establishes regulatory authority and compliance obligations. Under Section 12, projects must undergo Environmental Impact Assessment approval before implementation, while Sections 16–17 empower regulators to control pollution and impose penalties (Government of Pakistan, 1997). Climate policy instruments, particularly the National Climate Change Policy 2012, further institutionalise climate resilience and environmental planning mandates across sectors.

However, governance performance studies show that legal existence does not translate into effective enforcement. Environmental regulation in Pakistan operates within fragmented federal–provincial institutional arrangements, producing monitoring discontinuities and diluted accountability structures (Syed et al., 2024). Empirical evaluation of EIA systems demonstrates procedural compliance but weak post-approval oversight, technical review gaps, and limited field verification capacity (Khan et al., 2019). Enforcement agencies also face structural constraints, including budgetary shortages, compliance-cost pressures, and limited sanction execution, reducing deterrence power (Saeed et al., 2023).

These institutional weaknesses intensify in disaster contexts where humanitarian urgency overrides environmental scrutiny. Post-emergency environmental assessments following major flood responses report unmanaged debris disposal, relief-packaging waste, and ecosystem stress linked to regulatory absence rather than legal vacuum (UNEP/OCHA, 2010). Therefore, environmental governance in Pakistan reflects an enforcement deficit, where institutional capacity, not statutory design, determines ecological outcomes in humanitarian operations.

1.3 Donor Frameworks as De Facto Regulation in Humanitarian Operations

In contemporary humanitarian governance systems, environmental compliance is often structured more strongly by donor accountability frameworks than by host-state enforcement institutions (Fuchi, 2024). Recent sector analyses show that upward reporting to funding agencies shapes operational priorities more decisively than domestic regulatory oversight, particularly in crisis-affected states (Lie, 2020; Humanitarian Advisory Group, 2022). This dynamic reflects the political economy of aid dependence, where access to financial resources conditions organisational behaviour and compliance practices (Besiou et al., 2021).

Donor conditionality typically embeds environmental screening, safeguard review, and reporting requirements within funding agreements (De Moerloose, 2020). However, governance research suggests that the regulatory power of these safeguards derives less from their legal wording and more from their resource-control leverage (Pfeffer & Salancik, 2015; Greenwood et al., 2011). Organisations conform because funding survival depends on procedural alignment. This creates coercive isomorphic pressure in humanitarian fields, where legitimacy is externally evaluated through compliance documentation rather than domestic inspection regimes (DiMaggio & Powell, 1983; Sun, 2021).

Empirical humanitarian system studies further show that donor-driven accountability structures frequently operate parallel to, rather than integrated with, national environmental institutions, producing fragmented compliance architectures (Corbett et al., 2022; Humanitarian Outcomes, 2022). In Pakistan's 2022 flood response, environmental oversight was largely shaped by donor reporting cycles, while domestic environmental reform remained institutionally weak (World Bank, 2022; Syed et al., 2024). This substitution effect means donors can function as de facto environmental regulators. While this may elevate minimum safeguard standards, it risks marginalising domestic governance capacity and entrenching external accountability hierarchies.

1.4 Theoretical Framing of Environmental Governance Behaviour in Humanitarian Systems

Environmental performance gaps in humanitarian operations are not only technical failures. They reflect deeper institutional governance dynamics shaping how organisations prioritise environmental accountability (Cardoso et al., 2023). Studies on humanitarian supply chains show that ecological impacts persist not because mitigation tools are absent, but because governance incentives do not align environmental performance with operational survival (Van Wassenhove, 2006; Kovács and Moshtari, 2019). Humanitarian organisations operate in legitimacy-sensitive environments where donor confidence, reputational visibility, and audit credibility directly affect funding continuity (Barnett, 2011). Under such pressures, environmental commitments often remain procedural, embedded in reporting frameworks rather than operational logistics planning (Sanderson and Ramalingam, 2015).

Institutional Theory helps interpret this gap between commitment and implementation. Organisational fields characterised by external scrutiny often produce formal policy adoption without behavioural transformation, particularly where monitoring is weak or sanctions are absent (Boxenbaum & Jonsson, 2017). In humanitarian governance, environmental policies may therefore function as legitimacy artefacts rather than performance instruments (Kramarz & Park, 2016). This dynamic is reinforced by resource dependence structures, where organisations align compliance priorities with actors controlling financial flows rather than domestic regulators (Pfeffer & Salancik, 2015). Empirical studies on aid governance confirm that donor reporting architectures frequently override host-state regulatory frameworks in operational decision-making (Fiori et al., 2016). Ecological Modernisation Theory (Mol et al., 2009) provides a complementary lens by explaining the sector's growing reliance on technological optimization. Digital logistics modelling, satellite environmental monitoring, and AI-assisted procurement systems are increasingly framed as mechanisms to reduce humanitarian carbon intensity while maintaining delivery speed (Weber & Weber, 2020; Tatham and Spens, 2018). However, technology effectiveness depends on governance embedding. Field research shows sustainability technologies in crisis operations often remain short-term pilot initiatives due to funding volatility and weak institutional integration (Pateman et al., 2021).

Environmental Justice theory extends the analysis beyond compliance systems to distributive outcomes. Where environmental monitoring is weak, ecological burdens, including waste accumulation, land degradation, and emissions exposure, are displaced onto disaster-affected populations (Schlosberg, 2007). This reframes environmental performance not only as an operational metric but as an accountability obligation within humanitarian ethics frameworks (Hilhorst and Jansen, 2010). Together, these theoretical perspectives frame environmental governance gaps as institutional, technological, and justice-linked phenomena rather than purely managerial inefficiencies.

1.5 Research Gap and Empirical Contribution

Despite growing institutional attention to "greening humanitarian action", empirical evidence on how environmental governance operates in fragile humanitarian settings remains limited. Existing scholarship and sector reports largely focus on normative commitments, operational toolkits, or pilot sustainability initiatives rather than measurable compliance patterns across organisations (Besiou et al., 2021; Humanitarian Advisory Group, 2022). Quantitative assessments are particularly scarce in South Asian crisis contexts, where weak domestic regulatory enforcement allows donor conditionality to shape

environmental performance architectures. Pakistan reflects this structural gap, given its high disaster exposure yet limited sector-wide evidence on policy enforcement, monitoring systems, and legal anchoring within humanitarian operations. Addressing this deficit, the present study quantitatively analyses environmental governance practices across INGOs operating in Pakistan (n = 41; 12 organisations). It evaluates environmental policy adoption and enforcement depth, examines the balance between domestic legal anchoring and donor-framework compliance, assesses monitoring, reporting and verification (MRV) capacity and subcontractor oversight, identifies institutional implementation barriers, and statistically tests the association between AI adoption and long-term environmental compliance. Through this integrated assessment, the paper advances empirical understanding of how environmental governance functions in donor-dominated humanitarian systems.

1.6 Methodology

This study employed a cross-sectional quantitative research design to assess environmental governance practices among international humanitarian organisations operating in Pakistan. A survey-based design was selected to generate standardised institutional data on compliance systems, monitoring practices, donor accountability, and technological adoption. Quantitative institutional mapping is appropriate where governance behaviour must be measured comparatively across organisations rather than explored through single-case narratives (Bryman, 2016). The target population comprised international humanitarian NGOs registered with Pakistan’s Ministry of Interior and operational in environmentally exposed sectors, including disaster response, climate resilience, WASH programming, and recovery logistics. These operational domains were selected because they generate measurable environmental externalities linked to infrastructure deployment, procurement chains, energy use, and waste management.

Due to the absence of a consolidated public database of environmental compliance personnel and the sensitivity of organisational governance data, non-probability purposive sampling was adopted. Organisations with active environmental, sustainability, or compliance functions were prioritised. Snowball referral was subsequently used to reach relevant institutional actors, including programme managers, environmental specialists, and compliance officers embedded within operational units. The final dataset comprised 41 respondents representing 12 INGOs operating across multiple administrative regions of Pakistan. While statistical generalisation is not claimed, the sample captures sectorally representative governance practices within international humanitarian operations.

Data were collected through a structured questionnaire consisting of 29 closed-ended items organised across six governance dimensions: policy institutionalisation, environmental monitoring systems, donor conditionality, domestic regulatory anchoring, implementation barriers, and AI-enabled monitoring adoption. Variables were measured using binary, ordinal, and categorical scales to enable inferential testing of governance relationships. Instrument construction was informed by environmental compliance frameworks and humanitarian sustainability accountability tools, ensuring construct validity. Pilot testing was conducted to refine wording clarity and response reliability.

Descriptive statistics profiled institutional governance structures. Inferential analysis included chi-square testing to examine associations between policy formalisation and technological monitoring adoption; Spearman correlation to assess relationships between audit institutionalisation, KPI breadth, and long-term compliance; and regression modelling to identify predictors of donor-driven environmental compliance. Statistical significance was evaluated at $p < .05$. Participation was voluntary and anonymous. No identifiable organisational data were collected. The study adhered to professional research ethics and digital data protection standards (BSA, 2017).

1.7 Results and Analysis

Environmental governance practices were examined using survey responses from 41 officials representing 12 international humanitarian organisations operating across Pakistan. Respondents occupied compliance-relevant roles, including programme management, environmental oversight, and policy coordination, enabling institutionally informed reporting. Descriptive institutional profiling is not presented independently due to journal space constraints. Analytical emphasis is placed on environmental policy enforcement, monitoring and verification systems, donor conditionality, and technology adoption patterns. Both descriptive indicators and inferential statistical tests are integrated to evaluate compliance depth, governance drivers, and the structural factors shaping environmental performance within humanitarian operations.

1.8 Environmental Policy and Compliance Practices

Variable	Category / Response	Frequency	Percent (%)
Presence of Environmental Policy	Yes, fully documented and implemented	17	41.5%
	Yes, but not strictly enforced	9	22.0%
	No, but environmental aspects are considered	10	24.4%
	No environmental policy	5	12.2%
Regulatory Frameworks Referenced	PEPA 1997	2	4.9%
	National Climate Change Policy 2012	7	17.1%
	International frameworks (e.g. Paris Agreement, SDGs)	14	34.1%
	Donor-specific guidelines (UN, EU, USAID)	14	34.1%
	Other	4	9.8%
Responsible for Compliance	Dedicated environmental officer/team	10	24.4%
	Project managers or field teams	21	51.2%

	No specific compliance role	10	24.4%
Frequency of Compliance Audits	Annually	17	41.5%
	Per project	16	39.0%
	No audits conducted	8	19.5%
Compliance Challenges Reported	High cost of compliance	13	31.7%
	Lack of coordination with government	11	26.8%
	Lack of internal expertise	9	22.0%
	Other	6	14.6%
	Unspecified/unclear	2	4.9%

Table 3 presents environmental governance structures across participating INGOs. While 41.5% reported fully documented and implemented environmental policies, a larger combined proportion (58.5%) operated without strong enforcement or without formal policies. Notably, 22.0% acknowledged policies that were not strictly enforced, and 36.6% functioned with either informal consideration or no policy at all, indicating institutional decoupling between policy adoption and operational practice. Regulatory anchoring appeared externally oriented. Only 4.9% referenced the Pakistan Environmental Protection Act (PEPA 1997), and 17.1% cited the National Climate Change Policy. In contrast, 68.2% aligned with international or donor-driven frameworks, suggesting stronger compliance incentives linked to funding conditionality than domestic legal enforcement.

Institutional capacity gaps were also evident. Just 24.4% maintained dedicated environmental compliance staff, while most organisations (51.2%) delegated compliance responsibilities to project or field teams. Audit systems showed similar variability, with 19.5% reporting no compliance audits. Key operational barriers included high compliance costs (31.7%), weak government coordination (26.8%), and limited technical expertise (22.0%). Collectively, these findings indicate that environmental governance in the sector is policy-visible but operationally uneven, shaped by external regulatory pressure and internal capacity constraints rather than domestically institutionalised enforcement.

1.9 Environmental Impact and Monitoring Strategies

Variable	Response	Frequency	Percent (%)
Environmental Impact Assessment	Carbon footprint analysis	15	36.6%
	Energy consumption audits	4	9.8%
	No formal impact assessment	22	53.7%
Use of AI Tools	Yes, extensively	3	7.3%
	Yes, but limited usage	5	12.2%
	No, but planning to adopt	15	36.6%
	No AI tools used	18	43.9%
Long-Term Sustainability Efforts	Post-project monitoring	9	22.0%
	Community-based programs	11	26.8%
	Partnerships with local agencies	5	12.2%
	No long-term tracking	16	39.0%
Funding Constraints	Yes, frequently	17	41.5%
	Occasionally	23	56.1%
	No funding challenges	1	2.4%
Sustainability KPIs Tracked	Renewable energy adoption	10	24.4%
	Water conservation	10	24.4%
	Waste reduction & recycling	6	14.6%
	No specific KPIs	15	36.6%

Table 4 reports institutional capacity for environmental impact measurement and sustainability monitoring across participating INGOs. Formal environmental impact assessment systems remain limited. While 36.6% conducted carbon footprint analysis, and only 9.8% reported energy consumption audits, a majority (53.7%) operated without any structured impact assessment mechanism. This indicates that environmental effects of humanitarian operations often remain unmeasured at organisational level. Technological integration was similarly uneven. Only 7.3% reported extensive use of AI tools, and 12.2% reported limited application. In contrast, 43.9% had no AI adoption, although 36.6% indicated future adoption plans, suggesting emerging but not institutionalised digital environmental monitoring capacity.

Long-term sustainability tracking also appeared weak. Only 22.0% conducted post-project monitoring, and 39.0% reported no long-term environmental tracking systems. Community-based sustainability initiatives (26.8%) were more common than institutional monitoring frameworks. Financial constraints emerged as a structural barrier. Nearly all organisations reported funding limitations, with 41.5% indicating frequent constraints and 56.1% occasional constraints. Monitoring indicators reflected similar gaps, with 36.6% tracking no sustainability KPIs. Where KPIs existed, they focused mainly on renewable energy and water conservation. Overall, the findings suggest that environmental governance remains operationally under-institutionalised, characterised by weak monitoring systems, limited technological integration, and resource-dependent sustainability tracking.

1.10 Stakeholder & Donor Accountability

Question	Response Options	Frequency	Percentage (%)
Compliance with donor-specific environmental requirements	Yes, fully	22	53.7
	Partially	12	29.3
	No specific donor requirements	7	17.1
Impact of donor expectations on sustainability policies	Encourages stricter compliance	13	31.7
	Conflicting regulations	10	24.4
	Limits local flexibility	18	43.9
Tracking compliance of subcontractors	Third-party audits	8	19.5
	Internal review mechanisms	19	46.3
	No tracking system	13	31.7
	Other	1	2.4
Penalties for non-compliance with sustainability policies	Internal warnings	11	26.8
	Financial penalties	8	19.5
	Termination of partnerships	4	9.8
	No penalties	18	43.9
Donor penalties or funding withheld for non-compliance	Yes	10	24.4
	No	31	75.6

Table 5 examines donor conditionality, stakeholder accountability, and subcontractor oversight within environmental governance structures of participating INGOs. A majority of organisations (53.7%) reported full compliance with donor-specific environmental requirements, while 29.3% indicated partial compliance. However, 17.1% operated without any donor environmental conditions, suggesting uneven safeguard coverage across funding streams. Donor influence on sustainability governance appeared structurally significant but operationally complex. While 31.7% reported that donor expectations strengthened compliance, a larger share identified governance tensions. Specifically, 43.9% stated donor rules limited local operational flexibility, and 24.4% reported conflicting regulatory frameworks between donors and domestic systems. This indicates that donor safeguards may simultaneously enforce compliance while constraining contextual adaptation. Subcontractor accountability emerged as a major governance gap. Only 19.5% relied on third-party environmental audits, and 46.3% used internal monitoring mechanisms. Critically, 31.7% reported having no subcontractor tracking systems, exposing downstream implementation risks where environmental safeguards may weaken during project delivery. Penalty frameworks were similarly underdeveloped. While internal warnings (26.8%) and financial penalties (19.5%) were reported, the largest proportion (43.9%) had no formal sanctions for environmental non-compliance. Donor enforcement mechanisms were also limited, with only 24.4% reporting funding penalties linked to environmental breaches. The findings suggest that donor frameworks function as primary compliance drivers, but enforcement depth remains uneven, particularly in subcontractor governance and penalty institutionalisation.

1.11 Formal Environmental Policy and AI-Based Tracking

Crosstabulation

	Does your organization use AI-based tools for environmental impact tracking?					Total
	Yes, extensively	Yes, limited usage	No, but planning to adopt	but No AI tools used		
Organization have a formal environmental compliance policy?	Count	3	5	2	7	17
	Expected Count	1.2	2.1	6.2	7.5	17.0
	% within Organization	17.6%	29.4%	11.8%	41.2%	100.0%
Organization have a formal environmental compliance policy?	Count	0	0	5	4	9
	Expected Count	.7	1.1	3.3	4.0	9.0
	% within Organization	0.0%	0.0%	55.6%	44.4%	100.0%
	Count	0	0	7	3	10
	Expected Count	.7	1.2	3.7	4.4	10.0

	No, environmental aspects are considered	but have a formal environmental compliance policy?	% within Organization	0.0%	0.0%	70.0%	30.0%	100.0%
	No environmental policy	Count	0	0	1	4	5	
		Expected Count	.4	.6	1.8	2.2	5.0	
		% within Organization	0.0%	0.0%	20.0%	80.0%	100.0%	
Total		Count	3	5	15	18	41	
		Expected Count	3.0	5.0	15.0	18.0	41.0	
		% within Organization	7.3%	12.2%	36.6%	43.9%	100.0%	

AI adoption remains structurally low across the sample, but its distribution varies significantly by policy enforcement depth. Organisations with fully documented and implemented environmental policies show the highest technological integration. Within this group, 47.0% report active AI use (17.6% extensive; 29.4% limited), exceeding expected counts, indicating governance–technology alignment. However, even among formal adopters, 41.2% report no AI use, suggesting partial operationalisation of policy commitments.

In contrast, organisations where policies exist but lack enforcement show no active AI deployment; 55.6% remain in planning stages and 44.4% report no adoption. A similar pattern appears where environmental aspects are considered informally, with 70.0% planning adoption but none implementing. Entities without any policy display the weakest technological engagement, with 80.0% reporting no AI tools.

The association between formal policy institutionalisation and AI-based monitoring is statistically significant ($\chi^2(9) = 20.42, p = .015$), indicating that governance formalisation is positively linked to digital compliance capacity, though operational gaps remain even among policy leaders.

1.12 Correlation between Audit Frequency and KPI Breadth

Correlations

	How frequently does the organization conduct compliance audits	How frequently does the organization track to measure sustainability progress	Correlation Coefficient	Sig. (2-tailed)	N
Spearman's rho	How frequently does the organization conduct compliance audits	How frequently does the organization track to measure sustainability progress	1.000	.325*	41
			.	.038	41
	What specific KPIs does your organization track to measure sustainability progress	What specific KPIs does your organization track to measure sustainability progress	.325*	1.000	41
			.038	.	41

*. Correlation is significant at the 0.05 level (2-tailed).

Spearman's rank-order correlation indicates a statistically significant positive relationship between compliance audit frequency and the breadth of sustainability KPIs tracked ($\rho = .325, p = .038, N = 41$). The coefficient suggests a moderate association. Organisations conducting audits more frequently tend to track a wider range of sustainability indicators. This pattern indicates that audit institutionalisation is linked with expanded monitoring practices rather than minimal or symbolic reporting.

1.13 Organisational Tools and Sustainability Practices

Correlations

	Specific KPIs	Use AI-based tools	Long-term compliance	Challenges in implementing
Spearman's rho	Specific KPIs	Use AI-based tools	Long-term compliance	Challenges in implementing
	Correlation Coefficient	1.000	.238	.228
	Sig. (2-tailed)	.	.135	.151
	N	41	41	41

Use AI-based tools	Correlation Coefficient	.238	1.000	.394*	-.097
	Sig. (2-tailed)	.135	.	.011	.546
	N	41	41	41	41
Long-term compliance	Correlation Coefficient	.228	.394*	1.000	-.181
	Sig. (2-tailed)	.151	.011	.	.257
	N	41	41	41	41
Challenges in implementing	Correlation Coefficient	-.010	-.097	-.181	1.000
	Sig. (2-tailed)	.952	.546	.257	.
	N	41	41	41	41

Correlation analysis shows a statistically significant positive relationship between AI-based tool usage and long-term environmental compliance ($\rho = .394, p = .011, N = 41$). The association is moderate in strength. Organisations utilising AI tools demonstrate stronger sustained compliance engagement. No statistically significant relationships are observed between KPI breadth and AI usage ($\rho = .238, p = .135$), KPI breadth and long-term compliance ($\rho = .228, p = .151$), or implementation challenges and compliance variables ($p > .05$). This indicates that technological adoption is specifically associated with long-term compliance continuity rather than overall monitoring diversity or perceived implementation barriers.

1.14 Predictors of Donor-Specific Environmental Compliance

Parameter Estimates

The organization comply with donor-specific environmental requirements ^a	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Yes, fully	Intercept	37.362	1958.627	.000	1	.985		
	Donor expectations impact policies	-.965	.832	1.346	1	.246	.381	.075 1.945
	Organization track the environmental compliance	-1.334	.835	2.557	1	.110	.263	.051 1.352
	Penalties exist within the organization	.069	.531	.017	1	.897	1.071	.378 3.032
	Donors penalized or withheld funding	-15.894	979.313	.000	1	.987	1.251E-7	.000 .b
Partially	Intercept	1.314	2.531	.269	1	.604		
	Donor expectations impact policies	-.765	.859	.792	1	.373	.465	.086 2.508
	Organization track the environmental compliance	-.764	.755	1.025	1	.311	.466	.106 2.045
	Penalties exist within the organization	.749	.574	1.699	1	.192	2.114	.686 6.515
	Donors penalized or withheld funding	.324	.000	.	1	.	1.383	1.383 1.383

Likelihood Ratio Tests

Effect	Model Fitting Criteria Likelihood Ratio Tests			
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	69.643	25.801	2	<.001
Donor expectations impact policies	45.363	1.522	2	.467
Organization tracks the environmental compliance	46.913	3.072	2	.215
Penalties exist within the organization	46.742	2.901	2	.234
Donors penalized or withheld funding	52.981	9.140	2	.010

The multinomial logistic regression model is statistically significant, indicating improved model fit over the intercept-only model ($\chi^2 = 24.627, p = .002$; Nagelkerke $R^2 = .523$). Likelihood ratio testing identifies donor penalties or funding withdrawal as the only statistically significant predictor of donor-specific environmental compliance ($\chi^2 = 9.140, p = .010$). Other predictors, including donor expectation pressure, internal compliance tracking, and internal penalties, are not statistically

significant ($p > .05$). This indicates that external funding risk is the primary institutional driver of donor compliance behaviour within the sample.

1.15 Determinants of Donor-Specific Environmental Compliance

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.658	3	1.553	3.047	.041 ^b
	Residual	18.854	37	.510		
	Total	23.512	40			

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.078	.563		.139	.890		
	Organization conduct compliance audits	.127	.101	.203	1.258	.216	.836	1.196
	Organization use AI-based tools	-.260	.132	-.312	1.974	.056	.866	1.155
	Organization faced challenges	.266	.212	.188	1.255	.217	.962	1.039

The regression model is statistically significant ($F(3,37) = 3.047, p = .041$), explaining 19.8% of variance in donor-specific compliance ($R^2 = .198$). AI tool usage shows the strongest predictive effect ($\beta = .312, p = .056$), approaching statistical significance. Compliance audit frequency ($p = .216$) and organisational implementation challenges ($p = .217$) are not significant predictors. Collinearity diagnostics are within acceptable limits ($VIF < 1.2$), indicating model stability.

Discussions

Environmental governance across INGOs operating in Pakistan reflects a pattern of formal policy adoption but uneven operational institutionalisation. Although 41.5% of organisations reported fully documented environmental policies, enforcement gaps remain widespread. Institutional theory explains this divergence through symbolic compliance, where organisations adopt formal structures to maintain legitimacy without embedding operational change (DiMaggio & Powell, 1983). In donor-dependent humanitarian systems, policy adoption is often shaped by resource acquisition pressures rather than internal governance transformation (Pfeffer & Salancik, 2015). The limited anchoring of domestic frameworks, such as the Pakistan Environmental Protection Act and National Climate Change Policy, reinforces this externally oriented compliance structure (Adnan et al., 2024). Institutional multiplicity further complicates enforcement, as INGOs operate within overlapping regulatory environments combining donor safeguards, international treaties, and host-state legislation (Greenwood et al., 2011). In humanitarian governance contexts, upward accountability to donors frequently outweighs domestic environmental enforcement obligations (Barnett, 2011).

Monitoring and environmental measurement systems remain structurally underdeveloped. More than half of organisations reported no formal environmental impact assessment, and over one-third tracked no sustainability KPIs. This weak measurement infrastructure reflects incomplete ecological modernisation, where environmental governance lacks technological, institutional, and economic integration (Mol and Spaargaren, 2000). In humanitarian operations, environmental impacts, particularly logistics emissions, infrastructure deployment, and waste generation, require structured monitoring to become governable (Van Wassenhove, 2006; Corbett et al., 2022). The absence of measurement frameworks limits sustainability performance visibility. Sector evidence shows that climate-induced humanitarian crises in Pakistan, including floods and deforestation, are intensifying operational environmental footprints (Development Initiatives, 2022; Anadolu Agency, 2024). Without KPI institutionalisation, sustainability commitments remain declarative rather than operationally measurable. Organisational culture also shapes environmental performance capacity; weak environmental embedding reduces monitoring prioritisation (Bakhsh Magsi et al., 2018).

Technological adoption patterns further illuminate governance maturity. Although AI deployment remains limited, its association with formal policy institutionalisation is statistically significant. Organisations with fully embedded environmental frameworks demonstrate higher technological integration. Digitalisation research shows that artificial intelligence enhances environmental monitoring, predictive risk assessment, and compliance reporting in humanitarian supply chains (Khan et al., 2022). AI-enabled tracking improves coordination, resource efficiency, and environmental accountability across complex relief networks (Pantiris et al., 2025). Ecological modernisation theory similarly positions technological innovation as a core driver of environmental reform once governance structures mature (Hajer, 1995). However, adoption remains resource-dependent.

Financial constraints, reported by nearly all respondents, limit digital transformation capacity, reflecting broader funding pressures across climate-affected humanitarian contexts in Pakistan (Avdeenko & Frölich, 2025; Adnan et al., 2024).

Audit institutionalisation plays a measurable governance role. The positive correlation between audit frequency and KPI breadth indicates that review mechanisms expand sustainability monitoring depth. Audit systems translate environmental commitments into performance-based accountability structures. Within humanitarian operations, internal verification processes substitute for weak regulatory enforcement and strengthen environmental compliance routines (Fiori et al., 2016). Sustainable humanitarian operations literature similarly emphasises auditing as a mechanism for operationalising environmental safeguards across project cycles (Besiou et al., 2021). Measurement expansion through audits reflects governance learning, where organisations gradually institutionalise sustainability reporting practices (Corbett et al., 2022). However, monitoring sophistication remains uneven, constrained by funding volatility and operational urgency characteristic of crisis response systems (Château & Mavroei, 2023).

Donor conditionality emerges as the most decisive governance driver. Regression findings identify donor penalties or funding withdrawal as the only statistically significant predictor of environmental compliance. Resource dependence theory provides a direct explanation: organisations align behaviour with actors controlling financial survival (Pfeffer & Salancik, 2015). Donor frameworks therefore function as coercive institutional mechanisms shaping environmental governance priorities (DiMaggio and Powell, 1983). Empirical humanitarian research confirms that environmental safeguards are most rigorously implemented where linked to funding conditionality (Pateman et al., 2021). However, compliance remains externally anchored. Nearly half of organisations lack internal sanctions for environmental breaches, and subcontractor oversight systems remain weak. This exposes governance vulnerabilities across outsourced humanitarian logistics chains (Besiou et al., 2021; Van Wassenhove, 2006). Upward accountability structures prioritise donor reporting over downstream operational enforcement (Barnett, 2011). Donor influence also generates governance tensions. While some organisations report strengthened compliance, others highlight regulatory conflicts and reduced local flexibility. Institutional complexity theory predicts such friction when organisations navigate competing rule systems (Greenwood et al., 2011). In climate-vulnerable contexts like Pakistan, where humanitarian needs intersect with environmental crises, rigid donor frameworks may constrain adaptive sustainability strategies (Chaudhry et al., 2022; Earth.org, 2024). Balancing accountability with contextual flexibility remains a central governance challenge. Environmental governance within Pakistan's humanitarian sector reflects externally incentivised compliance, emerging technological integration, and limited domestic institutional embedding. Policy formalisation, audit systems, and AI adoption strengthen compliance depth, yet donor financial leverage remains the dominant behavioural driver. Domestic regulatory alignment, subcontractor governance, and long-term monitoring institutionalisation remain critical structural gaps.

Conclusions, Recommendations, and Limitations

This study examined environmental governance practices among international humanitarian organisations operating in Pakistan, focusing on policy institutionalisation, monitoring systems, donor conditionality, and technological adoption. The findings indicate that environmental governance is formally visible but operationally uneven. While many organisations report environmental policies, enforcement depth, monitoring institutionalisation, and domestic legal anchoring remain limited. Compliance behaviour is shaped primarily by donor conditionality rather than national regulatory enforcement. Technological integration—particularly AI-based monitoring—shows positive association with long-term compliance continuity, yet adoption remains low and structurally uneven. Overall, environmental governance within humanitarian operations reflects externally driven accountability rather than internally embedded institutional systems.

Several policy and operational recommendations emerge. First, humanitarian organisations should institutionalise dedicated environmental compliance units rather than diffuse responsibility across programme teams. Specialised governance structures strengthen monitoring continuity and accountability depth. Second, environmental monitoring must move beyond symbolic reporting toward measurable KPI systems integrated into project cycles. Third, donor frameworks should harmonise environmental reporting standards to reduce fragmentation and administrative duplication. Fourth, subcontractor environmental accountability requires formal tracking mechanisms and enforceable contractual safeguards. Finally, investment in digital environmental monitoring tools—particularly AI, GIS, and remote sensing—should be prioritised, as technological systems demonstrate measurable compliance-enhancing effects when embedded within formal governance frameworks.

Despite its contributions, the study has limitations. The cross-sectional design captures institutional patterns at one point in time and cannot assess longitudinal governance evolution. The sample size ($n = 41$) and purposive sampling strategy limit statistical generalisability, although findings remain analytically transferable across comparable humanitarian contexts. Data rely on self-reported organisational practices, which may involve reputational or reporting bias. Additionally, qualitative institutional dynamics—such as donor negotiation processes or field-level compliance practices—were beyond the scope of the quantitative design. Future research should integrate longitudinal and mixed-method approaches to examine how environmental governance institutionalises over time and how technological monitoring systems reshape accountability structures within humanitarian operations.

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