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Environmental Disclosure and Financial Performance: Evidence from Environmentally Sensitive Sectors Across Global Markets

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Abstract

This study examines how environmental disclosure influences financial performance in environmentally sensitive industries such as energy, mining, manufacturing, and chemicals. Using a purposive sample of 20 firms from North America, Europe, and emerging economies, the analysis covers the period 2010–2024 and draws on ESG data from Bloomberg, the Global Reporting Initiative (GRI), and the Carbon Disclosure Project (CDP). The research adopts a positivistic approach with deductive reasoning, applying regression and generalised method of moments models to account for endogeneity and omitted variable bias. Data on environmental disclosure were obtained from Bloomberg ESG, the Global Reporting Initiative, and the Carbon Disclosure Project, while financial performance indicators, including return on assets, return on equity, and Tobin Q, were sourced from Bloomberg, Compustat, and Thomson Reuters. The results show that higher environmental disclosure scores and explicit environmental goals are positively and statistically significantly associated with return on assets, return on equity, and Tobin's Q, supporting stakeholder and legitimacy theory perspectives. In contrast, greenhouse gas emissions and energy use disclosures exhibit negative relationships with performance, reflecting the financial costs of inefficiencies, regulatory compliance, and reputational risks. Disclosures related to water use and waste management show no consistent significant effects. The significant negative association between fines and performance highlights the financial risks of non-compliance. The findings suggest that proactive, strategic environmental disclosures can enhance profitability, while reactive or compliance-driven disclosures may impose costs. The study provides practical implications for managers, investors, and policymakers, emphasising the integration of environmental disclosure into corporate governance through standardised frameworks (GRI, TCFD), third-party assurance, and linking sustainability targets to executive incentives.

Keywords: Environmental Disclosure, Financial Performance, Sustainability Reporting, Corporate Transparency

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INTRODUCTION

The growing expectations of stakeholders, the global environmental crises, and environmental, social, and governance criteria as a rising influence in investment decisions have increased the significance of environmental disclosure in corporate reporting over the past two decades. Environmental disclosure is the reporting of environmental activities, risks, strategies, and performance measures of firms to stakeholders through reports, filings, and voluntary sustainability disclosures (Kuo & Chen, 2020; Siddique et al., 2025). With companies facing climate change, resource scarcity, and environmental regulation, environmental disclosure has become an important mechanism to promote transparency, accountability, and long-term value creation (Clarkson et al., 2008; Mehdi et al., 2025).

Corporate environmental disclosure gained momentum following the 2005 implementation of the Kyoto Protocol, which was amplified by the 2015 Paris Agreement, leading to the integration of standards such as the Global Reporting Initiative, CDP, and the Task Force on Climate-related Financial Disclosures (Hummel & Schlick, 2016; Abbasi et al., 2025). These frameworks promote disclosure of greenhouse gas emissions, energy consumption, water use, waste management, environmental fines, and ratings of compliance with climate objectives. The global trend toward sustainability reporting reflects both regulatory requirements and market demand linking environmental stewardship with corporate financial performance (Ioannou & Serafeim, 2015; Amir et al., 2025).

Financial performance, a central concern for managers and investors, is often measured by key ratios such as Return on Assets, Return on Equity, and Tobin Q (Fatemi et al., 2018). The relationship between environmental disclosure and financial performance has attracted substantial academic interest, as firms increasingly recognise that environmental stewardship can generate reputational benefits, mitigate operational risks, enhance investor confidence, and improve resource efficiency, all of which may contribute to higher returns (Eccles et al., 2014; Arshi et al., 2025). For example, the European Union's Corporate Sustainability Reporting Directive (CSRD) has made ESG disclosures mandatory from 2024, while in Pakistan, the Securities and Exchange Commission (SECP) has issued ESG disclosure guidelines for listed firms, reflecting growing institutional pressure for standardized reporting.

Despite the expanding body of literature, most prior studies are limited to single-country samples, short time frames, or aggregated disclosure scores that overlook disaggregated components such as emissions, fines, and goals. This study fills that gap by adopting a multi-year (2010–2024), multi-region sample of 20 firms across environmentally sensitive sectors and by employing advanced econometric methods (panel regression and GMM) to assess both aggregate and disaggregated disclosure indicators. This design provides stronger evidence of the causal effects of environmental disclosure on financial performance. Existing literature presents mixed findings. Some researchers argue that increasing environmental disclosure improves financial performance by reducing information asymmetry and regulatory risk (Cormier & Magnan, 2007; Aerts et al., 2008; Batool et al., 2025). Others caution that the costs of preparing and assuring such disclosures may outweigh short-term gains in competitive or resource-constrained environments (Brammer & Pavelin, 2006; Naeem et al., 2025). Moreover, the relationship between environmental disclosure and financial performance may depend on industry characteristics, firm size, governance quality, and stakeholder pressure (Akbas, 2016; Ali et al., 2025).

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The strategic importance of environmental disclosure became more visible after the 2008 financial crisis, as stakeholders demanded greater accountability and transparency in non-financial performance. Corporations began integrating environmental disclosures into financial reports, a shift supported by the rise of responsible investing and the launch of the United Nations Principles of Responsible Investment in 2006, which encouraged institutional investors to emphasise environmental, social, and governance transparency (Amel-Zadeh & Serafeim, 2018). Between 2020 and 2025, environmental reporting accelerated, driven by regulatory activity, investor activism, and heightened public concern over climate risks. The COVID-19 pandemic further increased awareness of corporate resilience, non-financial reporting, and sustainable long-term strategies over short-term profitability (Khan et al., 2021; Ali et al., 2025). Environmentally sensitive industries such as energy, manufacturing, and transportation faced intensified scrutiny regarding emissions, environmental management, and climate risk mitigation. Environmental disclosure thus emerged as a strategic communication tool, signalling responsibility and operational integrity to capital markets (Alsaifi et al., 2020; Ali et al., 2025; Longston et al., 2025).

Despite the growing prominence of environmental disclosure, its empirical relationship with financial performance remains contested. This study addresses that gap through a longitudinal cross-country analysis of companies in environmentally intensive sectors between 2005 and 2025. It examines greenhouse gas emissions, energy use, water and waste management, environmental fines, third-party verification, and alignment with established frameworks to identify the elements of environmental disclosure most associated with improved financial performance. Ultimately, the relationship between environmental disclosure and competitive performance reflects broader shifts in corporate governance and market expectations. As environmental risks become increasingly material to business valuation, proactive and transparent reporting offers competitive advantages, including stronger investor relations, enhanced brand equity, and better access to capital. This study contributes to the literature through a multi-decade analysis that provides a comprehensive understanding of how sustainability reporting practices can be leveraged to improve financial performance.

LITERATURE REVIEW

The relationship between environmental disclosures and a business's financial performance has become a central topic in academic and policy debates, particularly amid increasing global interest in sustainability and responsible corporate conduct. Environmental disclosure can be defined as the acts and processes through which an organisation reports its environmental performance, policies, and impacts via formal platforms such as annual reports, sustainability reports, and environmental, social, and governance databases. Many researchers have examined whether greater transparency in environmental matters yields superior economic returns. While some argue that environmental disclosure creates long-term value through enhanced reputation and stakeholder trust, others emphasise potential short-term costs and question its financial significance.

The theoretical foundations of environmental disclosure are informed by multiple perspectives. Stakeholder theory asserts that corporations have responsibilities not only to shareholders but also to a broader community of stakeholders, including customers, regulators, and civil society (Freeman, 1984). From this perspective, reducing information asymmetry through responsible disclosure can foster trust and increase firm valuation (Clarkson et al., 2008). Legitimacy theory posits that environmental reporting enables

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firms to meet societal expectations and maintain legitimacy, particularly under heightened environmental scrutiny (Suchman, 1995). Conversely, agency theory warns that disclosure may serve managerial interests without adequate oversight, resulting in "greenwashing" or symbolic statements without substantive environmental action (Cho and Patten, 2007). Overall, the literature reveals three broad patterns. First, several studies support a positive link between disclosure and financial performance, highlighting benefits such as reputational gains and reduced capital costs (e.g., Al-Tuwaijri et al., 2004; Clarkson et al., 2011; Dhaliwal et al., 2011). Second, other studies report negative or insignificant associations, suggesting that the financial costs of compliance and disclosure can outweigh benefits in the short term (Hassel et al., 2005; Brammer et al., 2006). Finally, mixed findings emerge where the effect depends on industry sensitivity, governance quality, or regional context (Prado-Lorenzo & Garcia-Sanchez, 2010; Gerged et al., 2021). This mixed evidence underscores the need for context-specific, multidimensional analyses.

Empirical evidence on the environmental disclosure–financial performance relationship remains inconclusive, with results varying due to differences in samples, disclosure measures, and institutional contexts. Several studies report a positive association. For instance, Al-Tuwaijri et al. (2004) applied a simultaneous equations model and found that firms with stronger environmental performance and more extensive disclosures also achieved higher financial performance. Similarly, Clarkson et al. (2011) showed that high-quality environmental disclosures—those that are specific, verifiable, and quantitative—are positively related to firm value and profitability. These findings suggest that environmental transparency can indicate managerial efficiency, low regulatory risk, and long-term strategic orientation, thereby enhancing financial success.

The literature also addresses the influence of environmental disclosures on firm valuation in capital markets. For example, Dhaliwal et al. (2011) found that firms engaging in voluntary environmental disclosure experience lower costs of equity capital, particularly when disclosure is perceived as consistent and credible, thereby reducing uncertainty and enhancing investor confidence. Eccles et al. (2014) reported that companies with strong sustainability performance and robust environmental, social, and governance disclosure outperformed their counterparts in both stock market and accounting-based measures over the long term. However, the positive effect is not universal or immediate. Hassel et al. (2005), examining a Swedish sample, found a negative relationship between environmental disclosures and stock returns, suggesting that investors may interpret such disclosures as cost burdens or indicators of poor environmental practices. Similarly, Brammer et al. (2006) observed that stronger environmental performance was associated with lower short-term stock returns, possibly due to the costs of implementing sustainable strategies or limited investor interest in the short term.

The credibility and quality of disclosures are critical determinants of their impact. Concerns about greenwashing are underscored by Cho et al. (2012), who demonstrated that firms with weak environmental performance often increase disclosure as a means of managing public perception and securing legitimacy, without genuine commitment. Consequently, the volume of disclosure is not necessarily indicative of authentic engagement and may erode investor trust if perceived as insincere. Voluntary initiatives such as the Global Reporting Initiative and the Carbon Disclosure Project have encouraged firms to improve the quality and standardisation of disclosures, enhancing their value to investors (Kolk, 2008).

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Environmental disclosure is also shaped by the institutional setting in which it occurs. Prado-Lorenzo and Garcia-Sanchez (2010) attributed this to the fact that firms in highly regulated countries, with effective enforcement mechanisms, produce more consistent and reliable disclosures, leading to a stronger relationship with financial results. In contrast, disclosures may be ineffective in weak institutional environments, yielding neither genuine performance improvements nor financial returns. Similarly, Luo et al. (2013) found that the positive link between environmental disclosure and market reward is stronger in countries with developed financial systems and high investor protection, where disclosure reliability is presumed to be greater. Sectoral differences further complicate this relationship. Studies indicate that environmental disclosure has a greater impact in environmentally sensitive industries such as energy, mining, and chemicals, where firms face heightened media and governmental scrutiny (Cormier and Magnan, 2007). In such industries, companies employ environmental disclosure not only to demonstrate compliance but also to shape perception, attract green investors, and differentiate themselves from competitors. By contrast, the financial relevance of disclosure is often reduced in less sensitive industries.

Dynamic perspectives in the literature suggest that the disclosure–performance relationship can evolve. Qiu et al. (2016) concluded that although environmental disclosure may be costly initially, firms that maintain consistent levels and approaches to reporting often experience long-term financial benefits, including operational efficiency and brand strengthening. Similarly, Hussain et al. (2018) found that sustained environmental engagement and disclosure improve long-term outcomes such as investor loyalty, employee motivation, and customer retention. An emerging focus is integrated reporting, which combines financial and non-financial information in a single report. Velte and Stawinoga (2017) observed that integrated environmental disclosure can enhance financial performance through its holistic and strategic orientation, though critics note that standardisation and comparability remain challenging due to the complexity and resource demands of integration.

Technological advances are transforming environmental reporting. Digitalisation and data analytics are enabling investors and regulators to better assess the financial materiality of disclosures. Enhanced environmental, social, and governance data collection and machine-based analysis can improve disclosure quality and reduce information asymmetry, strengthening the disclosure–performance link (Busch et al., 2020). For instance, in South Asia, the SECP in Pakistan and the Reserve Bank of India have both introduced ESG and green finance reporting guidelines, yet disclosure quality remains inconsistent compared to European Union directives or U.S. SEC proposals. This institutional gap makes cross-country comparisons especially valuable.

Recent literature in the 2020s reflects the growing integration of environmental, social, and governance considerations into investment decisions and regulatory frameworks. For example, Gerged et al. (2021) found that environmental disclosure positively and significantly affects financial performance in environmentally sensitive industries in the Middle East. Ali et al. (2022) reported that European Union–listed companies with highly disclosed and audited environmental policies achieve greater market valuation and profitability, attributing this to reduced investor uncertainty and enhanced firm credibility. Ngwakwe and Manda (2023) showed, using sub-Saharan firm-level data, that environmental disclosures enhance long-term financial performance, though short-term effects are not statistically significant. Martinez-Ferrero et al. (2023) demonstrated that compliance with frameworks such as the Task Force on Climate-related

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Financial Disclosures fosters investor trust and improves equity performance. Jung et al. (2024) applied machine learning to assess environmental, social, and governance reporting trends and found that advanced, data-driven disclosure mechanisms are strongly associated with lower capital costs and greater resilience to economic shocks such as the COVID-19 pandemic.

Previous studies have examined the relationship between environmental disclosure and financial performance in different contexts, the evidence remains inconsistent because of variations in disclosure measures, institutional settings, and industry coverage (Hassel et al., 2005; Brammer et al., 2006; Clarkson et al., 2011; Audi, 2022; Lopez & Peters, 2025). Much of the existing research is limited to single-country analyses (Prado-Lorenzo and Garcia-Sanchez, 2010; Gerged et al., 2021; Jamel & Zhang, 2024; Ito & Zhang, 2025) or short observation periods (Ali et al., 2022), which restricts understanding of how disclosure practices and their financial impacts evolve (Qiu et al., 2016; Audi & Ali, 2018; Hussain et al., 2018; Roussel & Audi, 2024; Al-Masri & Ibrahim, 2025; Marc et al., 2025). Only a few studies have considered both aggregate and detailed disclosure indicators such as greenhouse gas emissions, energy use, water and waste management, environmental fines, and assurance practices within one comprehensive framework, even though prior work shows that the quality, specificity, and independent verification of disclosure strongly influence market responses (Dhaliwal et al., 2011, Cho et al., 2012, Martinez-Ferrero et al., 2023; Marc & Yu, 2024; Audi et al., 2025). Research also gives limited attention to environmentally sensitive sectors in an international comparative perspective, although these industries operate under greater regulatory pressure, reputational scrutiny, and operational risk (Cormier and Magnan, 2007; Ngwakwe and Manda, 2023; Marc, 2024). This leaves room for a multi-year and multi-region investigation that examines the financial effects of different components of environmental disclosure while accounting for variations in institutional environments and sector-specific characteristics, which remains underdeveloped in the current literature. Thus, while prior studies provide valuable insights, gaps remain in terms of longitudinal, multi-region analysis and disaggregated disclosure dimensions. Few studies have simultaneously examined GHG, energy, water/waste, fines, and goals within one framework. This study addresses these gaps by applying panel regression and GMM across 20 international firms from 2010–2024, thereby offering more robust evidence of how specific disclosure components influence financial performance.

RESEARCH METHODOLOGY

The research follows a positivistic approach, employing deductive reasoning to examine the effect of environmental disclosure on corporate financial performance. Based on an objectivist epistemology, the methodology aligns with the research question, which focuses on a statistical analysis of the impact of various dimensions of environmental disclosure on firm performance. Grounded in empirical evidence, the study tests theoretical propositions derived from stakeholder theory, legitimacy theory, and agency theory, using robust econometric methods. It is designed as an explanatory, quantitative, and longitudinal study. The objective is to analyse the causal relationship between environmental disclosure and financial performance over the period 2010 to 2024. The panel consists of publicly traded companies from environmentally sensitive sectors such as energy, mining, manufacturing, and chemicals in North America, Europe, and selected emerging economies. These sectors are chosen due to their exposure to significant regulatory and societal scrutiny regarding environmental practices, making them suitable for assessing the strategic and financial implications of environmental transparency (Cormier & Magnan, 2007).

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The study relies exclusively on secondary data. Environmental disclosure data are obtained from sustainability reports, annual reports, and environmental, social, and governance databases, including Bloomberg ESG, Thomson Reuters Eikon, the Carbon Disclosure Project, and the Global Reporting Initiative. Firms were selected based on three criteria: (1) continuous environmental disclosure between 2010–2024, (2) complete availability of financial data, and (3) representation across energy, manufacturing, mining, and chemical industries. This purposive sampling ensures that the sample reflects firms under the highest environmental scrutiny. Financial performance measures and firm-level control variables are sourced from Thomson Reuters, Bloomberg, and Compustat datasets. Firms are selected using purposive sampling based on three criteria: consistent environmental reporting during the study period, availability of financial data, and location within environmentally sensitive industries. The final sample of 20 firms is expected to provide reliable data for meaningful statistical conclusions. The environmental disclosure score (EDS) was measured on a 0–100 scale (Bloomberg ESG). GHG, energy, and water/waste disclosures were coded on a 1–5 scale based on reporting depth. Environmental fines and environmental goals were binary (1 = disclosed, 0 = not disclosed). Third-party assurance was coded as 1 if present, 0 otherwise.

The dependent variable is financial performance, measured using three indicators: Return on Assets, Return on Equity, and Tobin Q. These metrics combine accounting and market-based perspectives to capture both profitability and firm valuation. The main independent variable is environmental disclosure, operationalised using environmental, social, and governance disclosure scores from Bloomberg and the Carbon Disclosure Project. These scores reflect the breadth, credibility, and specificity of reporting on aspects such as emission reduction, resource efficiency, pollution control, and environmental risk management (Clarkson et al., 2008; Prado-Lorenzo & Garcia-Sanchez, 2010; Luo et al., 2013; Gerged et al., 2021). The model of our study becomes:

$$FP_{it} = \beta_0 + \beta_1 Ed_{it} + \beta_2 GHG_{it} + \beta_3 EN_{it} + \beta_4 WST_{it} + \beta_5 FINES_{it} + \beta_6 GOALS_{it} + \beta_7 3Pa_{it} + \beta_8 Controls_{it} + \mu_i + \epsilon_{it}$$

Where FP refers to financial performance, ED represents general environmental disclosure, GHG, EN, WST, FINES, GOALS, and 3PA represent the individual disclosure components; μ_i captures firm-specific effects; and ε_{it} is the error term.

Panel regression models were used to control for firm-specific heterogeneity, with fixed and random effects tested via the Hausman specification. GMM was employed to address potential endogeneity between disclosure and performance, making results more robust compared to ordinary least squares. In addition to the overall environmental disclosure score, the study incorporates disaggregated independent variables to examine the multidimensional nature of disclosure. These include:

- GHG Emissions Disclosure – quantifies the reporting quality and completeness of greenhouse gas emissions data, both direct and indirect.
- Energy Usage Disclosure – reflects the transparency in reporting total and renewable energy consumption, energy efficiency strategies, and energy intensity metrics.
- Water and Waste Disclosure – measures the level of detail provided in reporting water consumption, waste generation, and recycling efforts.
- Environmental Fines and Compliance Reporting – represents disclosure of past regulatory violations, fines paid, and compliance strategies, which may influence investor trust and perceived risk.

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- Environmental Goals and Target Disclosure – includes long-term sustainability targets such as carbon neutrality, zero-waste objectives, and progress against these goals.
- Third-Party Assurance of Reports – captures whether the environmental data is externally verified or audited, reflecting the credibility of the disclosures.
- Use of Reporting Frameworks (e.g., GRI, TCFD) – indicates the adoption of globally accepted reporting standards which enhance comparability and transparency.

The sample comprises 20 publicly traded firms operating in environmentally sensitive industries, including energy, manufacturing, chemicals, and mining. Companies were selected using three criteria. The first was continuous and publicly accessible environmental disclosures for the 2010 to 2024 period. The second was the availability of complete financial reporting data from Bloomberg, Compustat, and the Carbon Disclosure Project. The third was geographic diversity, ensuring representation from North America, Europe, and emerging economies. Purposive sampling was used to ensure that only firms with consistent disclosure practices and comprehensive financial data were included. Data were collected from environmental, social, and governance platforms such as Bloomberg ESG, the Global Reporting Initiative, and the Carbon Disclosure Project, along with annual reports and filings sourced from Thomson Reuters and Compustat. The resulting panel dataset supports robust longitudinal analysis and allows comparability across firms and regions.

RESULTS AND DISCUSSION

This section examines how environmental disclosure can influence the financial performance of a firm through an extensive quantitative analysis. The descriptive statistics were first reviewed to understand the central tendencies, distribution, and variability of the key variables, including return on assets, environmental disclosure score, and specific dimensions such as greenhouse gas emissions, energy use, water, waste, goals, and fines.

The descriptive results are presented in Table 1. The main dependent variable, return on assets, has a mean value of 7.8 per cent, indicating that most firms generate moderate profits relative to their total assets. The lower bound is negative at 12 per cent, showing that some firms are operating at zero profit or a loss, while the upper bound is 22 per cent, reflecting high profitability in others. This variation justifies investigating potential factors behind the performance differences, including environmental disclosure. The average environmental disclosure score is 55.34 out of 100, with extremes of 22 and 90. This suggests that while some firms provide a high level of disclosure, others lag significantly. Similarly, component indicators such as greenhouse gas emissions, energy usage, and water and waste reporting have average scores near the midpoint of the one-to-five scale, supporting the view that disclosure practices are generally moderate across the sample.

Categorical indicators, including fines and compliance (0.38), environmental goals and targets (0.61), third-party assurance (0.42), and reporting framework usage (0.65), show that about one-third of companies report on environmental targets, around half follow formal reporting frameworks, and a small proportion are subject to fines or employ external assurance. Control variables, including total assets, leverage, and research and development intensity, display expected financial characteristics. The spread of total assets is moderate, leverage levels are relatively low, and research and development intensity is low, consistent with non-technologically intensive industries worldwide (Gharsalli, 2019). The balanced variability of environmental and financial measures strengthens the dataset, supporting its suitability for regression analysis and causal inference. These findings

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indicate that differences among firms extend beyond financial performance to the degree of accountability and transparency in environmental practices.

TABLE 1: DESCRIPTIVE STATISTICS

Variable	Mean	Std. Dev.	Min	Max
Return on Assets (ROA)	0.078	0.052	-0.12	0.22
Environmental Disclosure Score	55.34	15.21	22	90
GHG Emissions Disclosure	3.45	1.22	1	5
Energy Usage Disclosure	2.88	1.1	1	5
Water & Waste Disclosure	2.73	1.3	1	5
Fines & Compliance	0.38	0.49	0	1
Environmental Goals & Targets	0.61	0.49	0	1
Third-Party Assurance	0.42	0.49	0	1
Use of Reporting Frameworks	0.65	0.48	0	1
Total Assets (log)	15.23	1.87	11.2	20.1
Leverage	0.47	0.21	0.05	0.9
R&D Intensity	0.041	0.023	0	0.101

The value of the correlation matrix lies in its ability to provide insight into the linear relationships between environmental disclosure variables and financial performance indicators. The results of the correlation analysis are presented in Table 2. The most notable finding is that the environmental disclosure score has a strong positive correlation with greenhouse gas emissions disclosure, with a coefficient of 0.62, followed closely by energy usage disclosure at 0.59 and environmental goals at 0.60. This suggests that firms actively reporting greenhouse gas emissions and setting environmental objectives tend to perform well in overall disclosure outcomes, reflecting a strategic commitment to transparency in environmental practices.

Fines and compliance show negative correlations with most other variables, particularly with the environmental disclosure score (-0.41), return on assets (-0.40), and return on equity (-0.37). This supports the observation that firms receiving environmental fines not only disclose less but also tend to underperform financially, indicating reputational and financial costs of non-compliance. The positive associations between the environmental disclosure score and financial indicators such as return on assets (0.44), return on equity (0.39), and Tobin Q (0.32) indicate that environmentally transparent firms may achieve stronger profitability and higher market valuation. These findings support stakeholder theory and legitimacy theory, which suggest that trust and legitimacy contribute to financial benefits. The moderate correlation between environmental goals and Tobin Q (0.36) further implies that markets may view environmental strategies favourably over the long term.

Financial performance indicators are also strongly related to one another, with return on assets and return on equity showing a correlation of 0.66, which is expected as both are derived from net income relative to assets and equity. Overall, the correlation analysis supports the hypothesis that environmental responsibility and disclosure are associated with stronger financial performance (Lu & Taylor, 2018). However, the moderate strength of these correlations indicates that environmental disclosure is not the sole determinant of financial outcomes and is likely influenced by other strategic, operational, and market factors. While most correlations remain moderate, none exceed 0.7, suggesting multicollinearity is unlikely to bias regression results.

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TABLE 2: CORRELATION ANALYSIS

Variables	EDS	GHG	Energy	WaterWaste	Fines	Goals	ROA	ROE	TobinQ
EDS	1								
GH	0.62	1							
Energy	0.59	0.61	1						
WaterWaste	0.55	0.48	0.5	1					
Fines	-0.41	-0.36	-0.33	-0.28	1				
Goals	0.6	0.51	0.47	0.45	-0.34	1			
ROA	0.44	0.41	0.38	0.31	-0.4	0.37	1		
ROE	0.39	0.35	0.32	0.29	-0.37	0.34	0.66	1	
TobinQ	0.32	0.29	0.27	0.25	-0.3	0.36	0.42	0.38	1

Table 3 presents the outcomes of the simple regression. The environmental disclosure score coefficient is positive at 0.062 and significant at the 5 percent level, indicating that stronger environmental disclosure is associated with higher financial performance. This suggests that companies with transparent environmental reporting tend to gain greater investor trust, which may enhance profitability. This finding aligns with stakeholder theory, which holds that reputational capital and financial confidence can be built through openness in sustainability matters (Russo & Perrini, 2010).

The coefficient for greenhouse gas emissions disclosure is negative (-0.038) and statistically significant, suggesting that firms with higher levels of emissions are more likely to experience declines in financial performance. This supports the view that environmental inefficiencies or regulatory costs linked to emissions can harm profits. Investors may also penalise firms perceived to have harmful climate impacts, further reducing profitability (Yadin, 2023).

Energy usage has a negative coefficient (-0.045) and is statistically significant, indicating that high energy consumption or inadequate energy efficiency is associated with lower return on assets. This may imply that excessive or inefficient energy use increases costs or creates negative stakeholder perceptions (Lee, 2015). Energy saving can therefore be considered cost-effective.

The coefficient for water disclosure is 0.010 and not statistically significant, showing no clear relationship between water usage disclosure and financial performance in this dataset. This may suggest that variations in water disclosure are too minor to have financial relevance, or that investors do not yet assign high value to this measure (Edmans, 2023).

Waste disclosure has a positive coefficient (0.027) but is statistically insignificant, indicating that although improved waste management practices might enhance operational efficiency or generate cost savings, these effects are not strong enough to be significant in the present sample (Lohri et al., 2014).

Environmental goals disclosure has a positive coefficient of 0.070 and is highly significant, suggesting a meaningful positive effect on financial performance. This indicates that firms that set and report clear sustainability goals may benefit from stronger investor support, the attraction of environmentally conscious shareholders, and enhanced long-term strategic planning, all contributing to greater profitability. This supports the role of long-term environmental, social, and governance strategy in financial success.

The coefficient for fines is -0.055 and significant at the 1 per cent level, indicating a strong negative impact on return on assets. Firms receiving environmental fines tend to perform

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worse financially, reflecting both the direct monetary cost of fines and reputational damage (Greife & Maume, 2020). This underscores the financial risks of violating environmental regulations and reinforces the value of strong environmental governance.

TABLE 3: REGRESSION ANALYSIS

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Const	0.054	0.018	3	0.003
EDS	0.062	0.025	2.48	0.015
GHG	-0.038	0.019	-2	0.048
Energy	-0.045	0.021	-2.14	0.036
Water	0.01	0.016	0.63	0.531
Waste	0.027	0.017	1.59	0.116
Goals	0.07	0.022	3.18	0.002
Fines	-0.055	0.02	-2.75	0.007
R^2	0.67			
Adjusted R^2	0.64			
F-Statistics	21.45			
Prob(F-Statistics)	0.000			

The coefficient for environmental goals (0.07) indicates that a one-unit increase in goal disclosure is associated with a 7% increase in ROA, highlighting its economic significance. Conversely, the fines coefficient (-0.055) implies that non-compliance events reduce ROA by approximately 5.5%, a substantial negative effect for profitability.

Table 4 presents the outcomes of the generalised method of moments analysis. The environmental disclosure score has a coefficient of 0.059, indicating that environmental disclosure positively influences financial performance. This suggests that transparent firms are more likely to gain investor support, improve business efficiency, and comply with regulations, leading to higher return on assets (Xie et al., 2019). This result is consistent with stakeholder theory, which emphasises the potential for long-term profitability through sustainable communication.

The coefficient for greenhouse gas emissions disclosure is negative (-0.041) and significant at the 5 per cent level. This suggests that higher levels of emissions disclosure are associated with lower return on assets, potentially due to costs related to emissions management, monitoring, and compliance, as well as fines (Wang, 2023). While transparency is important, the short-term financial cost of emissions can outweigh reputational benefits.

Energy disclosure also has a negative coefficient (-0.049) and is statistically significant, suggesting that firms reporting higher energy use may face increased operational or compliance costs (Holthausen, 2009). While transparency remains essential, it may also reveal inefficiencies or strict regulatory oversight that impose immediate financial burdens.

Water disclosure has a small and statistically insignificant coefficient (0.008), indicating no clear link with financial performance in this dataset. This may reflect the relatively low financial cost or investor scrutiny of water-related activities compared to carbon or energy issues.

Waste disclosure has a positive but insignificant coefficient (0.025). This may point to potential operational benefits from waste transparency, such as efficiency gains or reduced disposal costs (Walker, 2008), though the effect is not consistent across firms.

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The environmental goals variable has a positive and significant coefficient (0.067). This finding suggests that companies with transparent sustainability goals are more likely to earn stakeholder approval, comply with regulations, and enhance their reputations, which contributes to stronger financial performance (Baah et al., 2021). Setting measurable objectives may also reflect a strategic vision that builds investor and partner confidence.

Environmental fines have a negative coefficient (-0.052) and are significant, indicating that firms reporting fines tend to have lower return on assets. This likely reflects both the direct monetary cost of fines and the reputational damage from non-compliance, reinforcing the financial risks of poor environmental governance.

Overall, the statistical results confirm that environmental disclosure has a measurable effect on financial performance, although the relationship varies across different disclosure types. The descriptive statistics provided balanced data distribution, and the correlation analysis revealed both positive and negative linear relationships. The regression results showed that proactive disclosures, such as clear sustainability goals, are positively linked to profitability, while reactive disclosures, such as fines or emissions reporting, can harm performance. The generalised method of moments results, which address endogeneity and omitted variable bias, support these findings. In conclusion, the evidence suggests that embedding environmental responsibility into corporate strategy can communicate to stakeholders that sustainability and profitability can reinforce one another rather than being mutually exclusive.

TABLE 4: GMM ANALYSIS

Variable	Coefficient	Std. Error	z-Statistic	p-Value
Const	0.047	0.017	2.76	0.006
EDS	0.059	0.024	2.46	0.014
GHG	-0.041	0.018	-2.28	0.023
Energy	-0.049	0.02	-2.45	0.015
Water	0.008	0.015	0.53	0.595
Waste	0.025	0.016	1.56	0.118
Goals	0.067	0.021	3.19	0.001
Fines	-0.052	0.019	-2.74	0.006
J-statistics	4.17			
Prob(J-Statistics)	0.124			

Across all analyses, the results show that proactive disclosures, such as setting clear environmental goals, are associated with stronger profitability, while reactive disclosures, such as fines or emissions reporting, can harm performance. The consistent patterns across descriptive statistics, correlation analysis, regression, and generalised method of moments models provide robust evidence that environmental responsibility, when embedded strategically, can support profitability. These findings convey to stakeholders that sustainability and financial performance can be mutually reinforcing rather than conflicting objectives.

CONCLUSION

This research investigated the relationship between environmental disclosure and financial performance among publicly listed firms in environmentally sensitive industries across North America, Europe, and emerging economies. Using a longitudinal dataset from 2010 to 2024 and applying both regression and generalised method of moments analysis, the study provided empirical evidence on how different aspects of environmental disclosure influence profitability and market valuation. The results consistently indicate that

environmental disclosure, when approached proactively and strategically, can enhance financial performance. Firms are encouraged to adopt standardized frameworks such as GRI and TCFD, link environmental KPIs to board and management evaluation, and pursue external assurance of disclosures to improve credibility. Governments can support compliance by offering tax incentives or preferential financing for firms demonstrating transparent sustainability performance. In particular, the environmental disclosure score and the disclosure of environmental goals were positively and significantly associated with return on assets, supporting the predictions of stakeholder and legitimacy theories. These findings suggest that transparent sustainability objectives can strengthen investor confidence, enhance reputation, and improve strategic alignment, leading to better financial outcomes. In contrast, disclosures related to greenhouse gas emissions and energy use were negatively associated with financial performance, reflecting the operational and compliance costs tied to these areas. While such transparency remains valuable for long-term trust and regulatory alignment, the short-term financial impacts may be adverse. Disclosures related to water use and waste showed no consistent significant effect, indicating that investor and market perceptions of these areas may still be evolving. The significant negative effect of fines underscores the financial and reputational risks of non-compliance with environmental regulations, reinforcing the importance of effective governance.

From a practical perspective, the results have implications for corporate managers, investors, and policymakers. Firms should prioritise setting measurable environmental goals, adopt standardised reporting frameworks, and ensure the quality and credibility of disclosures to maximise both financial and sustainability outcomes. Investors can use detailed and credible environmental reporting as a signal of long-term stability and governance quality. Policymakers should continue to promote harmonisation of reporting standards to improve comparability and reliability, thereby enhancing the informational value of environmental disclosures. The study's limitations include its focus on a relatively small sample of 20 firms and reliance on secondary disclosure scores, which may not capture qualitative differences in reporting practices. Future research could adopt larger multi-industry samples, apply qualitative content analysis of sustainability reports, and explore emerging disclosure dimensions such as biodiversity and climate risk adaptation.

Overall, the study contributes to the growing literature on the economic implications of environmental responsibility by offering multi-year, cross-market evidence that well-designed environmental disclosure strategies can create value. It reinforces the argument that integrating sustainability into the business model is not only an ethical imperative but also a pathway to improved financial performance.

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