DOES ENVIRONMENTAL AND SOCIAL DISCLOSURE FORETELL THE FINANCIAL PERFORMANCE OF OIL AND GAS BEHEMOTHS? EVIDENCE FROM THE EMERGING MARKET USING MIXED-METHODS RESEARCH

Ranjan Kumar *

* Indian Institute of Management (IIM), Lucknow, India
Contact details: Indian Institute of Management (IIM), IIM Road, Prabandh Nagar, Mubarakpur, 226013 Lucknow, Uttar Pradesh, India

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Abstract

Focusing on the sustainability disclosure of Indian oil and gas (O&G) behemoths, this study pursues two pertinent research objectives: 1) to investigate the relationship between environmental and social disclosures and corporate financial performance (CFP) metrics; 2) to conceptualize and thematically identify "fault lines" as areas of extreme vulnerability, for example, carbon emissions and groundwater depletion, created due to an intersection of adverse environmental and social impacts of the O&G sector (Alagoz, 2023). A mixed-methods research approach is employed, with panel data regression analysis addressing the first research objective, thus validating the hypotheses on relationships between social and environmental disclosure, and CFP metrics. For the second research objective, Braun and Clarke's (2012) six-step reflexive thematic analysis (RTA) technique is applied to identify sustainability reporting themes that correspond to the conceptualization of "fault lines". Data analysis provides partial and inconclusive evidence for sustainability disclosure metrics predicting CFP. Therefore, financial analysts and investors are advised to not rely on sustainability disclosure metrics as a bellwether for the financial performance of O&G companies. For the second research objective, three reporting themes — circular economy, climate change, and water stewardship — are identified as characterizing the "fault lines". Implications of this for socio-economic-environmental policy-making and the elusive global north-south consensus on environmental action are discussed.

Keywords: Environmental and Social Disclosure, Mixed-Methods Research, Reflexive Thematic Analysis, Indian Oil and Gas Behemoths

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1. INTRODUCTION

In a remarkable milestone for sustainability disclosure, nearly all of the world's largest 250 companies have adopted reporting on environmental, social, and governance (ESG) metrics. This is being driven by three key sustainability reporting standards — the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and country stock exchange guidelines — with the GRI being the most dominant (KPMG, 2022).

Three key long-term triggers are driving this profound shift in sustainability disclosure by large companies. First, institutional investors worldwide are actively demanding non-financial information like ESG data, which is valuable for them to assess the impact of ESG disclosure on financial risks and rewards (Amel-Zadeh, 2018). Blackrock, the largest asset management firm globally with US$9 trillion in assets under management (AUM), stated it is "losing patience" on the pace of ESG disclosure, and is insisting on detailed disclosure from large firms like Exxon (Tyson, 2021). Second, there is an irreversible regulatory push towards higher ESG stewardship, with governments and financial market regulators expecting or even mandating companies to report detailed ESG metrics (Lopez-de-Silanes et al., 2019). Third, corporate leaders, intending to make their businesses more resilient and more competitive, are increasing their focus on sustainability. This was a key conclusion from the 12th United Nations Global Compact CEO study, which surveyed more than 2,600 chief executive officers (CEOs) across 128 countries and 18 industries. Also, 98% of (CEOs) affirmed their accountability in integrating sustainability into their businesses, up from 83% a decade earlier (Cameron, 2023).

The ground status in India, the world's fifth-largest and fastest-growing major economy, is in line with the global trend, with 90% of the largest 250 companies having already adopted detailed ESG disclosure (KPMG, 2022). Furthermore, the Securities and Exchange Board of India (SEBI) has mandated the top 1000 listed entities to adopt comprehensive ESG disclosure incorporating a range of quantitative metrics (Cyrill, 2023). While these are promising developments, a much bigger task lies ahead. India is the third-largest energy consumer globally after the US and China, and nearly three-fourths of its energy mix is fossil-fuel-dependent (Energy Information Administration [EIA], 2022). The Indian economy is projected to double in the next seven years, reaching US$7.3 trillion in gross domestic product (GDP), surpassing Japan and Germany to emerge as the third-largest after the US and China (Biswas, 2023). This has an obvious, but significant implication for the world: India and large Indian oil and gas (O&G) behemoths, the latter with a direct stake in reducing carbon emissions and accelerating the country's transition to cleaner energy, will play a pivotal role in the global sustainability agenda. Further, as state-owned entities (except one) in a developing nation and the world's largest democracy, the business charter of these behemoths is intricately linked with the socio-economic priorities of the country. Despite the growing interest in and importance of sustainability reporting in developing countries, there remains a relative dearth of studies focusing on this theme geographically (Isiaka, 2022). Furthermore, to this author's best knowledge, objective scrutiny of the sustainability disclosure data and practices of the Indian O&G behemoths, either in theory or practice, has not been undertaken yet, despite the crucial role of these companies in the global ESG agenda.

In the aforementioned context, a two-stage scrutiny is undertaken aimed at two research objectives, focusing on sustainability reporting metrics and practices of the Indian O&G behemoths. Firstly, the relationship between environmental and social disclosure and their association with corporate financial performance (CFP) is investigated. Secondly, this research conceptualizes and thematically explores "fault lines", defining them as areas of extreme vulnerability, for example, carbon emissions and groundwater depletion, created due to an intersection of adverse environmental and social (human) impacts of the O&G sector. This original conceptualization is broadly inspired by extant research that has identified interdependencies and interactions between environmental, social, and economic issues arising from O&G business activities as a pertinent theme for further investigation (Alagoz, 2023; Heim et al., 2023; Scott & Pickard, 2020). A mixed-methods research approach is adopted to achieve the two research objectives; correlation and regression analysis of panel data addresses the first research objective, validating the hypotheses on relationships between social and environmental disclosure, and CFP metrics. Next, structured thematic content analysis using the six-step reflexive thematic analysis, or the RTA technique (Braun & Clarke, 2013) identifies unique sustainability reporting themes corresponding to the conceptualization of "fault lines" developed in this research.

The findings of this research are of enduring relevance to the financial and non-financial stakeholders of O&G sector behemoths and the broader ecosystem of sustainable development policy planning and stakeholder communication. Equally, the research is pertinent as Indian O&G behemoths, like their global counterparts, are aligning their business with social and environmental priorities consistent with the goals of the Paris Agreement (International Energy Agency [IEA], 2020). From an empirical perspective, this research validates the interlinkage between environmental and social disclosure, as well as the hypotheses that performance in these two domains can foretell CFP. Thematically, this research interprets and expands on empirical research findings to identify and categorize the key disclosure themes relating to the "fault lines" where environmental and human impacts intersect.

The paper is organized as follows. Section 2 reviews the relevant literature and summarizes the theoretical rationale of sustainability communication, developing a conceptual framework, and the ESG-CFP transmission pathway and illustrating the potential multi-tiered linkage between sustainability disclosure performance and CFP metrics. Section 3 provides the research and analytical methodology adopted to address the research objectives. Section 4 presents and discusses the data analysis results from descriptive statistics, correlation, and panel regression and discusses the thematic and practical implications of the findings. Finally, Section 5 presents the key limitations of this research and future possibilities.

2. LITERATURE REVIEW

2.1. Theoretical rationale of ESG reporting

This research argues that three enduring theories — the mutually-contrasting shareholder and stakeholder theories, and the signalling theory — provide a compelling theoretical rationale for ESG disclosure and reporting.

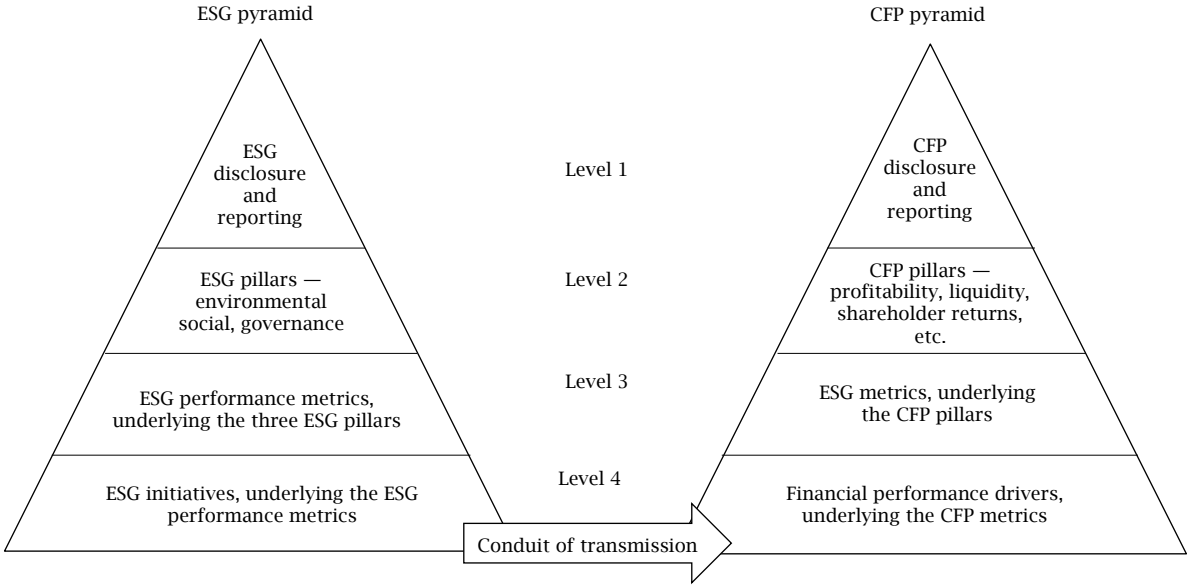
The shareholder theory states that "the social responsibility of a business is to increase its profits" (Friedman, 2007, p. 173). Conceptually, this implies that a business entity should focus on value creation and profits for its shareholders, and need not engage in activities to please other stakeholders. There could also be significant costs involved in adopting ESG practices, thus impacting the bottom line. Equally, pursuant to this theory, O&G companies must focus on ensuring the future readiness of their business model and sustaining its profitability for shareholders. This is by exercising strategic choices that enable their transition to broad-based energy companies having a mix of green energy portfolios. Another crucial endeavour for O&G companies has been to adopt ESG priorities, and monitor and report their progress on ESG-related metrics under the Paris Agreement (IEA, 2020). Since this endeavour addresses non-shareholder stakeholders as well, it may appear to conflict with the shareholder theory. However, ESG compliance and reporting are being demanded actively by shareholders globally, more so in the post-COVID milieu, with the expectation that O&G companies articulate clearly their environmental and social agendas and how these create value (Stevenson et al., 2022). So, O&G companies must cater to this demand, while also making their business model more competitive and resilient to the energy transition afoot, thus creating long-term value for shareholders. Therefore, as Shaban and Barakat (2023) concluded in a recent study investigating the relationship between sustainability reporting and financial performance, ESG reporting and its linkage with CFP is well-aligned with the shareholder theory.

In contrast, the stakeholder theory (Freeman & Evan, 1990) acknowledges all parties who have a stake in the firm. This implies that satisfying other "stakeholders" — customers, employees, suppliers, owners, managers, local communities, regulators, etc. — too is crucial to a firm's financial performance. On this note, Emeka-Okoli et al. (2024) observe that O&G companies "operate in a complex web of stakeholders" (p. 372), and contend that effective stakeholder relationship management requires proactive and transparent communication amidst intense stakeholder pressure and scrutiny, thus deftly managing diverse ESG expectations of stakeholders. Evidently, this is an agenda well served by ESG reporting. Also, Asogwa et al. (2022) concluded that robust and institutionalized sustainability processes enhance stakeholder engagement and ownership.

As per signalling theory, in scenarios of information asymmetry between two or more parties, the sender may choose to communicate (or signal) certain information desired by the receiver, who will then interpret the signal (Connelly et al., 2020). The applicability of this theoretical context is quite appropriate for ESG reporting, as it reduces information asymmetry between the insiders in a firm, i.e., managers and employees, and the outsiders, for example, institutional investors, customers, suppliers, and regulators through signalling. Wanday and El Zein (2022) assert that, by embracing ESG, O&G firms can convey they are socially responsible, build stakeholder confidence, and future-proof their business. Drawing a linkage between ESG performance and CFP, Lourenco et al. (2014) argue that firms that score high on corporate sustainability performance (CSP), measured through ESG metrics, are preferred by investors as high CSP signals capabilities for enhanced value creation and financial performance. An India-centric study (Dalal & Thaker, 2019) using panel data from 65 publicly listed large Indian firms found that ESG performance positively impacted financial as well as investor-focused metrics. On a similar note, a research study comprising five-year panel data of 77 Indian companies concluded that higher ESG disclosure and performance helped companies improve their financial performance as well as create a more favourable image and credibility (Kumar & Firoz, 2022). The argument for a positive impact of ESG performance on CFP is based on the notion that it is easier for ESG-compliant companies to acquire resources in comparison to companies with low ESG performance (Deephouse, 1999; Eliwa et al., 2019). Eliwa et al. (2019) explain that organizations with low ESG performance struggle for resources and financial and societal support. The financial performance of low ESG companies could also be affected by loss of market share, difficulty in hiring talent, and other resource constraints.

Anchored in the aforementioned theoretical rationale, Figure 1 conceptualizes a framework, the ESG-CFP transmission pathway, on the relationship between ESG and CFP performance. The topmost level represents ESG reporting as a visible non-financial communication activity, targeting the ESG and CFP stakeholders. At Level 2, we have the underlying ESG and CFP pillars, which are subsequently operationalized at Level 3 through the respective performance reporting metrics; for instance, the ESG pillars include metrics like greenhouse gas emissions, resource use, product responsibility, labour rights, boardroom diversity, etc. and the CFP pillars are represented by metrics like return on capital employed (ROCE), return on equity (ROE), return on assets (ROA), etc. The performance measurement happens at Level 3 through these metrics. Finally, serving as the foundation at Level 4, are the underlying initiatives and drivers that feed into the performance metrics of ESG and CFP.

Figure 1. The ESG-CFP transmission pathway



The central premise of this conceptual framework is that over an extended period of adoption, ESG initiatives can create a pathway to positively impact the underlying drivers of CFP. This transmission of financial gains through the conduit of ESG performance metrics is illustrated by the pathway connecting the ESG and the CFP pyramids at Level 4. Emphasizing such a linkage, a research study (Asogwa et al., 2022) on sustainability reporting processes and organizational learning and change concluded that sustainability reporting fostered the transfer of skill and innovation.

2.2. Hypotheses development

Baran et al. (2022) validated the relationship between environmental and social disclosure with three measures of profitability — ROA, ROE, and return on sales (ROS) — in a study focusing on eight dominant companies in the Polish energy sector. The authors did not find a consistent pattern of association, even though there were cases of high positive correlation. In a thesis work empirically examining European O&G companies, Danielsen and Lilland (2021) employed panel data regression to study the effects of ESG disclosure on three financial performance measures — ROA, ROE, and monthly change in market capitalization. They found that the overall effect of disclosure scores on financial performance was negative, whereas, Human Rights was the only disclosure subcategory that indicated a positive and significant, but weak effect.

Another thesis (Loftsgarden, 2020) investigated the ESG performance disclosure and CFP relationship using a panel dataset of 116 listed energy companies across two industry segments, O&G and energy equipment and services. While, the financial performance — measured by ROCE and ROA — of O&G companies was affected positively, that of the energy equipment segment had a negative effect. Also, among the three pillars — environmental, social, and governance — the social pillar had the strongest effect, followed by the governance pillar for O&G companies. A recent study (Ramirez-Orellana et al., 2023) used structural equation modeling for a sample of 219 O&G companies, to analyze the impact of the ESG index on their financial performance and financial risk. Results showed that the environmental and governance pillars in the ESG index have a positive impact on both financial performance and risk. Garcia et al. (2017) analyzed data from 365 companies in sensitive industries (including O&G) in the BRICS emerging economies — Brazil, Russia, India, China, and South Africa — and did not find a significant association between ESG performance and financial performance.

Deriving from the literature review summarized above, we hypothesize that environmental and social disclosure can positively foretell CFP:

H1: Environmental disclosure positively foretells the three CFP metrics — ROCE, ROA, and ROE.

H1a: Environmental disclosure is positively associated with ROCE.

H1b: Environmental disclosure is positively associated with ROA.

H1c: Environmental disclosure is positively associated with ROE.

H2: Social disclosure positively foretells the CFP metrics — ROCE, ROA, and ROE.

H2a: Social disclosure is positively associated with ROCE.

H2b: Social disclosure is positively associated with ROA.

H2c: Social disclosure is positively associated with ROE.

Additionally, this research validates the association between environmental and social disclosure by the O&G behemoths in India. This is theoretically rooted in the conceptualization of "fault lines" discussed earlier, as areas of extreme vulnerability, for example, carbon emissions and groundwater depletion where adverse environmental and social impacts intersect. Existing research supports the prevalence of this phenomenon in the O&G sector (Alagoz, 2023; Heim et al., 2023; Scott & Pickard, 2020). Thus, the hypothesis:

H3: Environmental and social disclosure have a statistically significant positive relationship, i.e., higher environmental disclosure would be accompanied by higher social disclosure and vice versa.

This relationship, if validated, can be considered as empirical evidence for the conceptualization of "fault lines", which will be thematically investigated to fulfill the second research objective.

3. RESEARCH METHODOLOGY

3.1. Sample and data collection

The study uses Bloomberg disclosure scores because of its ubiquity for ESG research and its practice of assigning weights to factors in terms of their relevance to a particular industry sector. ESG disclosure scores from Bloomberg have also been extensively used in academic literature (Nollet et al., 2016; Yu & Luu, 2021; Manita et al., 2018). Another reason for selecting Bloomberg ESG Disclosure Scores, over other authentic sources, is the former's emphasis on "disclosure", as the Bloomberg methodology measures not just ESG performance, but also the depth and quality of ESG reporting as a non-financial communication activity. The Bloomberg ESG disclosure score provides scores for the three ESG pillars along with the details of their constituents. For instance, for the environmental score, data on CO2 emission, energy consumption, total waste, and emission reduction, etc. can be found. Similarly, for the social score, the constituents include fair-trade principles, gender equality, number of employees, product safety, women-employee ratio, etc.

For this research, all publicly listed, Indian O&G companies that report ESG metrics, as measured by the Bloomberg ESG disclosure score, were chosen. There are only seven such companies — Bharat Petroleum Corporation Limited (BPCL), Gas Authority of India Limited (GAIL), Hindustan Petroleum Corporation Limited (HPCL), Indian Oil Corporation Limited (IOCL), Oil and Natural Gas Corporation (ONGC), Oil India Limited (OIL), and Reliance Industries Limited (RIL) — of which, barring RIL, all others are state-owned public sector units (PSUs). The ESG disclosure scores of these companies were uniformly available for the nine-year duration, FY12–20 (but not for earlier or later years), which therefore is the panel data period considered in this study. To reiterate, the small sample size was unintentional and beyond the control of this study, as there are only seven Indian O&G companies reporting the ESG metrics in the Bloomberg database, and all of them were included in the study cohort.

3.2. Analytical approach

For the first research objective, panel regression and correlation analysis were conducted on panel data, also known as longitudinal or cross-sectional time-series data, comprising multiple units over a period of time, in this case, seven companies over a nine-year duration. Since the same data points were collected for all the units (companies) for the same time points, and no data points were missing, this research used balanced as compared to unbalanced or incomplete panel data. Furthermore, when compared to linear regression, panel regression models provide more reliable parameter estimates by accounting for both cross-section and time effects in conjunction (Phillips & Moon, 1999). SPSS version 29.0 software package was deployed for panel data analysis.

For the second research objective, i.e., thematic identification of "fault lines" in sustainability reporting, the most recent sustainability reports of the O&G behemoths were considered as the data set on which the six-step RTA technique (Braun & Clarke, 2013) was applied. Braun and Clarke's (2012) six-step RTA technique was better suited for this research objective, as compared to its two alternatives — coding reliability and codebook approaches, both of which use a rigid, structured codebook — due to the following four reasons:

1) The RTA is a theoretically-flexible interpretative approach in which the researcher plays an active role in knowledge production and coding reliability is not a key concern.

2) The emphasis of this technique is on achieving richer interpretations of underlying patterns and meaning in the data set, instead of aiming for a single or "correct" answer. Thereby, RTA is about "the researcher's reflective and thoughtful engagement with their data and their reflexive and thoughtful engagement with the analytic process" (Braun & Clarke, 2019, p. 594).

3) The reflexive approach is organic, meaning the themes are not predefined to find "codes", but rather they are produced by organizing codes around a central concept that the researcher interprets from the data (Braun & Clarke, 2019).

4) The underlying reflexive aspect of the technique, whereby the researcher works iteratively through codes and themes, imparts validity and "trustworthiness" to the findings (Roberts et al., 2019).

3.3. Research model

Six regression models, as mentioned below, were developed to validate the hypothesized effects of environmental and social disclosure scores on the CFP metrics (*H1* and *H2*).

The individual variables are summarized in Table 1.

Model 1

$$ROCE_t = \alpha_0 Intercept_t + \alpha_1 EnvD_t + \alpha_2 Revenue_t + \alpha_3 Liq\_Rat_t + \alpha_4 Ast\_Tur_t + \alpha_5 Ownership_t + \varepsilon_t \quad (1)$$

Model 2

$$ROA_t = \alpha_0 Intercept_t + \alpha_1 EnvD_t + \alpha_2 Revenue_t + \alpha_3 Liq\_Rat_t + \alpha_4 Ast\_Tur_t + \alpha_5 Ownership_t + \varepsilon_t \quad (2)$$

Model 3

$$ROE_t = \alpha_0 Intercept_t + \alpha_1 EnvD_t + \alpha_2 Revenue_t + \alpha_3 Liq\_Rat_t + \alpha_4 Ast\_Tur_t + \alpha_5 Ownership_t + \varepsilon_t \quad (3)$$

Model 4

$$ROCE_t = \alpha_0 Intercept_t + \alpha_1 SocD_t + \alpha_2 Revenue_t + \alpha_3 Liq\_Rat_t + \alpha_4 Ast\_Tur_t + \alpha_5 Ownership_t + \varepsilon_t \quad (4)$$

Model 5

$$ROA_t = \alpha_0 Intercept_t + \alpha_1 SocD_t + \alpha_2 Revenue_t + \alpha_3 Liq\_Rat_t + \alpha_4 Ast\_Tur_t + \alpha_5 Ownership_t + \varepsilon_t \quad (5)$$

Model 6

$$ROE_t = \alpha_0 Intercept_t + \alpha_1 SocD_t + \alpha_2 Revenue_t + \alpha_3 Liq\_Rat_t + \alpha_4 Ast\_Tur_t + \alpha_5 Ownership_t + \varepsilon_t \quad (6)$$

Table 1. Variables in the research model

Variable name	*Type*	*Variable code*	*Description*
Return on capital employed	Dependent	*ROCE*	Earnings before interest and taxes (EBIT) / Total assets – current liabilities
Return on assets	Dependent	*ROA*	Net income / Total assets
Return on equity	Dependent	*ROE*	Net income / Average shareholder's equity
Environmental score	Independent	*EnvD*	Environmental pillar score from Bloomberg terminal
Social score	Independent	*SocD*	Social pillar score from Bloomberg terminal
Revenue	Control	*REV*	Taken as a proxy for firm size
Liquidity ratio	Control	*Liq_Rat*	Total debt / Total assets
Asset turnover	Control	*Ast_Tur*	Revenue / Average assets
Ownership	Control	*OWN*	Dummy variable – state-owned enterprise (SOE) or private sector, coded as 0 and 1, respectively
ε_t	Error	ε_t	Error term in the regression model, representing the difference between the observed and "modeled" value

To avoid model specification errors, we have included four control variables that could affect the chosen CFP metrics: revenue as a proxy for firm size (Dang et al., 2018), liquidity ratio (Takon & Ogakwu, 2013), asset turnover (Nurlaela et al., 2019), and ownership as SOE or a private sector entity (Phi et al., 2019).

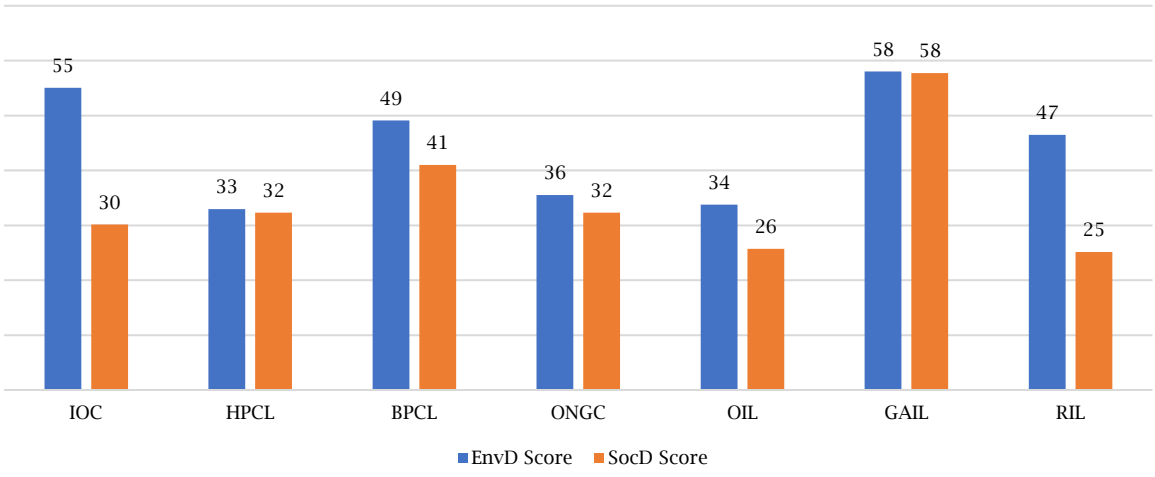
For validating *H3*, correlation analysis was conducted between *EnvD* and *SocD* scores, with the correlation coefficient enabling an interpretation of the strength and vector (positive or negative) of the relationship.

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics

Figure 2 summarizes the nine-year average of the environmental and social disclosure scores for the seven companies. As observed, GAIL, a Government of India-owned public sector company focused on natural gas exploration, processing, and distribution has the highest average score for both environmental and social disclosure.

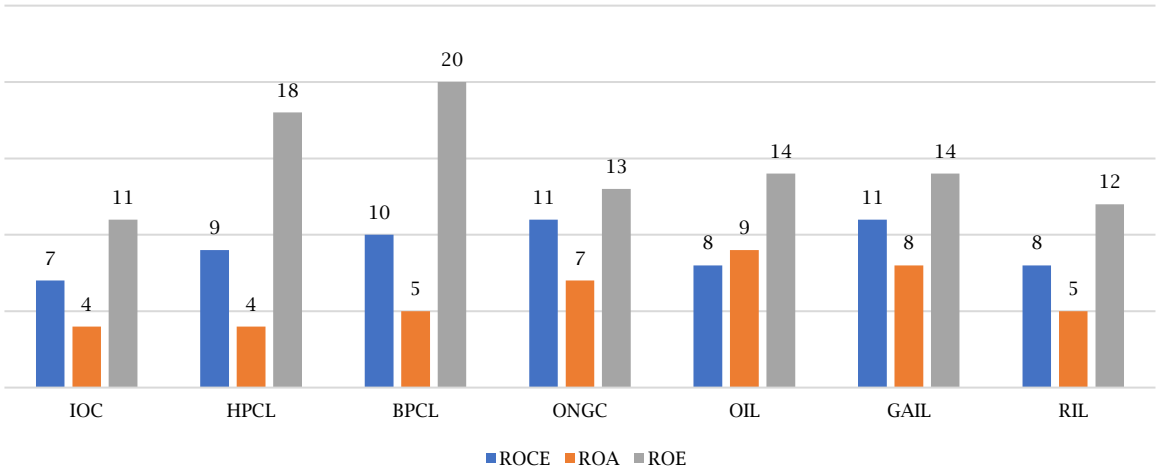
Figure 2. Mean disclosure scores for the nine years, FY12–20



Across the seven companies, the mean for environmental and social disclosure scores are 44 and 35, respectively. Evidently, social disclosure scores are lower than that of environmental disclosure for all companies except GAIL, with the lowest being for RIL, which is the largest company (by market cap and revenue) in India and owns the world's largest oil refinery in Jamnagar, Gujarat.

Figure 3 summarizes the nine-year average of the three CFP metrics — *ROCE*, *ROA*, and *ROE* — for the seven companies.

Figure 3. Mean CFP metrics for the nine years, FY12–20



On *ROCE*, GAIL and ONGC are the two-best performing companies with an average of 11%, whereas OIL (9%) and BPCL (20%) reported the highest average *ROA* and *ROE*, respectively.

4.2. Correlation analysis

Table 2 presents the correlation analysis output for the five ESG and CFP variables in the research model.

As observed, the social and environmental disclosure scores are positively correlated, and the relationship is moderately strong (r = 0.57) and statistically significant at a 1% level of significance. Therefore, *H3* is accepted.

Table 2. Correlation matrix

Variable	*EnvD*	*SocD*	*ROCE*	*ROA*	*ROE*
EnvD	1	**0.57****	0.33**	-0.017	0.01
SocD	0.57**	1	0.32*	0.094	0.11
ROCE	**0.33****	**0.32***	1	0.68**	0.79**
ROA	-0.02	0.01	0.68**	1	0.68**
ROE	0.01	0.11	0.79**	0.68**	1

*Note: ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).*

Considering the relationship between sustainability disclosure and CFP, both environmental and social disclosure have statistically significant and positive associations with *ROCE*, with correlation coefficients of 0.33 and 0.32, respectively. Therefore, hypotheses *H1a* and *H2a* are accepted.

However, the two disclosure scores have a weak and statistically insignificant relationship with *ROA* and *ROE*. Therefore, hypotheses *H1b*, *H1c*, *H2b*, and *H2c* are not accepted.

4.3. Regression analysis

We conducted linear regression analysis using SPSS to validate the six research models developed in subsection 3.2. Table 3 presents the panel regression output between the independent and the dependent variables.

Table 3. Regression output

Model	*Dep. Var.*	*Ind. Var.*	*Adjusted R^2*	*Regr. Coeff.*	*P-value*	*Result*
1	*ROCE*	*EnvD*	0.11	0.33	**0.01**	Reject H_0
2	*ROCE*	*SocD*	0.10	0.32	**0.01**	Reject H_0
3	*ROA*	*EnvD*	-0.01	-0.02	0.89	Accept H_0
4	*ROA*	*SocD*	-0.01	0.1	0.46	Accept H_0
5	*ROE*	*EnvD*	-0.01	0.1	0.44	Accept H_0
6	*ROE*	*SocD*	-0.01	0.11	0.36	Accept H_0

Models 1 and 2 are validated, indicating a significant positive predictive relationship of both environmental and social disclosure with *ROCE* as the CFP metric. The two adjusted R^2 values can be interpreted in terms of the hypothesized regression model explaining around 10% of the variance in *ROCE* and the remaining 90% as unexplained variance. Further, a positive regression coefficient indicates that higher disclosure may foretell higher *ROCE*, thus providing partial evidence for the first research objective. This result is partially consistent with that of an earlier study conducted by Kumar and Firoz (2022) on a cohort of 77 Indian companies across 30 sectors. However, in contrast with that study, the relationship with *ROA* was not validated.

Further, the following statistically significant relationships are indicated between three control variables and the dependent variable, CFP metrics:

• The liquidity ratio had a negative relationship with the three CFP metrics — *ROA*, *ROCE*, and *ROE*.

• Asset turnover had a significant positive relationship with the three CFP metrics.

• Ownership had a significant negative regression coefficient, implying private sector ownership may negatively impact the CFP metrics of O&G companies, whereas state- or government-ownership may positively impact financial performance. This is quite pertinent in the Indian context, as barring one company (Reliance Industries Limited), all other O&G behemoths are state-owned PSUs.

Overall, based on regression analysis, there is partial but inconclusive evidence for the hypothesized predictive relationships between environmental and social disclosure performance and CFP metrics.

4.4. Thematic content analysis for "fault lines"

Correlation analysis has established a moderately strong positive association (r = 0.57) between environmental and social disclosure, implying that higher disclosure in one area goes together with that in the other. Therefore, we can infer that this association underscores the presence of "fault lines", which we defined as areas of extreme vulnerability, for example, carbon emissions, industrial waste, threat to flora and fauna, groundwater depletion, etc., operating at the intersection of environmental and social (human) impacts of O&G sector value chain activities — exploration, refining operations, pipeline network expansion, petrochemicals production — requiring integrated sustainability actions.

The six-step RTA technique, discussed earlier in the Research Methodology section, was employed in the following manner for thematic analysis:

1) Data familiarisation: this involved several rounds of reading and re-reading the sustainability reports of the seven companies of the last three years to address the research objectives of identifying the "fault lines", as defined above.

2) Generating preliminary codes: these are succinct sentences or phrases — for example, "water conservation", "decarbonization", "recycle and reuse", and "carbon emission" — generated as precursors to the eventual themes, representing underlying commonalities across sustainability reports of different companies.

3) Generating potential themes: the focus shifted to aggregating the meaning derived from individual codes created in the earlier phase, by collapsing similar codes into a more inclusive theme, for example, "circular economy" and "climate change".

4) Reviewing potential themes: this was done to ensure that the key research objective of identifying the "fault lines", as defined, was fulfilled by each shortlisted theme. At this step, there were several iterations, going back and forth between steps 2–3 to organically refine the codes and thereby, the themes that were identified.

5) Defining and naming themes: next, textual excerpts from across companies were identified to explain each theme, thus providing a vivid account of what a theme stands for and what its implications could be in the broader context of the research objective.

6) Reporting the themes: as advised by Braun and Clarke (2014), the research followed the six-phase RTA as a non-linear, recursive process and finalized three themes, which are discussed below.

4.4.1. Promoting the circular economy

Indian O&G behemoths are emphasizing the adoption and implementation of circular economy initiatives at their plants, residential townships, and local communities. GAIL, the company with the highest environmental and social disclosure scores among the seven behemoths in this study, is driving a country-wide initiative to spread awareness on the 6Rs — rethink, refuse, repair, reuse, reduce, and recycle — among its workforce, value partners and communities via various mediums including social media. The company has collaborated with leading research and academic institutions in the country to develop technologies and processes that imbibe the circular economy principle, allocating 2.5% of profit as its research and development (R&D) expenditure target. Examples include a patented technology to convert solid waste generated in the plant and municipal solid waste generated in the township into useful products, a co-gasification hydrothermal process to produce carbon hydrides and hydrogen-rich methane as valuable by-products by using effluent water and biomass from petrochemical plants, and a hydrate-forming process to achieve zero liquid discharge, etc.

IOCL, the largest PSU O&G company in India, is implementing the circular economy across its supply chain and has defined the extended producer responsibility (EPR) targets for waste reduction, recycling, and reuse. At its Guwahati refinery in the Northeast, the oldest in the country, IOCL has transformed the vast residential township into a "zero waste township" through an innovative circular approach combining waste management, resource conservation, and environmental stewardship. In a unique product innovation that converts plastic waste from overburdened local community landfills into a valuable product, the company has developed Cycloplast, blending recycled petrochemicals with a carefully calibrated proportion of virgin or individual plastic components.

Articulating its circular economy vision, RIL, the largest Indian company by market cap and revenue, has defined one of its sustainability principles as "Business should provide goods and services in a manner that is sustainable and safe" (RIL, 2023, p. 14). The company has implemented several initiatives across its supply chain and value chain to reduce, recycle, and reuse waste, and eliminate any adverse environmental impact for its local communities and customers.

To drive the circular economy, BPCL is focusing on the biofuels segment through ethanol-blended fuel and compressed biogas, with the intent of reducing the oil import bill for the country, contributing to a cleaner environment, and protecting the farmers' economic interests, thus achieving both environmental and social upliftment goals.

4.4.2. Addressing climate change priorities

Another thematic priority for O&G behemoths in sustainability disclosure, which qualifies on our definition of a "fault line", is climate change. GAIL, unveiling its Net Zero Action Plan in the FY23 sustainability report cited the UN Climate Change Conference (COP21) held in December 2021:

"*To substantially reduce global greenhouse gas emissions to limit the global temperature increase in this century to well below 2 degrees Celsius while pursuing efforts to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels*" (GAIL, 2023, p. 121).

As the leading gas distributor agency in India, GAIL is driving initiatives to increase the share of natural gas in the country's energy mix from 7.5% to 15% by 2030. Articulating its intent, the company states, "We strive to transform the lives of the people we touch by providing improved and environment-friendly products and services in a sustainable way" (GAIL, 2023, p. 122). Working in this direction, the city gas distribution (CGD) unit of the company is issuing a letter of intent to interested entrepreneurs to set up 400 compressed biogas (CBG) plants, which will process municipal solid waste into and supply CBG to the CGD retail outlets as a sustainable and cheaper alternative to fossil-based transportation fuel.

Taking a similar long-term view, HPCL has enacted a "Climate Change Policy", which incorporates adaptation and mitigation measures to counter the adverse impacts of climate change and focuses on best practices with respect to health, safety and environment (HSE) for all its stakeholders. The company has also formed a biofuel and renewables SBU for focused attention on clean fuel segments. RIL is targeting a net carbon zero target by 2035, and in a related measure, undertaken an extensive life cycle assessment (LCA) across its 18 products to identify the five most relevant environmental impacts — acidification, eutrophication (marine), eutrophication (fresh water), water use, and human toxicity — that also affect the society and communities. IOCL is emphasizing biodiversity conservation and ecosystem conservation in its climate change initiatives: environmental impact assessment on local biodiversity and community resources; afforestation and greenbelt development; Miyawaki afforestation to transform small areas and spaces into mini forests in urban and semi-urban areas; nurturing rich biodiversity through eco-parks at its refineries, which have become a sanctuary for a diverse range of flora and fauna.

4.4.3. Water stewardship to address the water-stress challenge

The third thematic priority in a sustainability report of Indian O&G behemoths addresses a crucial "fault line" in the world's most populous nation with densely populated habitats, the majority of which are facing water scarcity and fast-depleting water resources.

IOCL states that India is ranked 13th out of the world's 17 most water-stressed nations, has adopted water stewardship as one of its key goals in environmental leadership, and focuses on three specific activities — water footprinting, wastewater reuse, and rainwater harvesting. The company states in its FY23 sustainability report:

"*By embracing sustainable practices, we forge a formidable shield against water scarcity, champion the preservation of aquatic ecosystems, lend vital support to agriculture, and diligently secure a dependable water supply for both humanity and nature. Rainwater harvesting (RWH) is an integral part of Indian Oil's commitment to water conservation and sustainable practices. Across our various locations and townships, we have implemented extensive rainwater harvesting systems and watershed projects to harness and manage rainwater effectively. The collected rainwater meets the demand for freshwater and as well as used to recharge the groundwater*" (IOCL, 2023, p. 57).

Following a similar theme in its FY23 sustainability report, BPCL (2023) stated on its water conservation and reuse policies:

"*BPCL has endeavoured to take various steps to minimise pressure on water bodies throughout the supply chain and mitigate any negative consequences of our operations. The water extraction for the BPCL operation causes no water stress in the water bodies from which it withdraws water. The overall consumption of water withdrawal rate has been reduced over the last few years*" (p. 129).

The company runs a water conservation program "BOOND" (meaning "a droplet") — an integrated model of water conservation and community awareness – that has been implemented in many villages around its areas of business operations. Project BOOND has transformed more than 230 villages in the six states of Maharashtra, Tamil Nadu, Karnataka, Uttar Pradesh, Rajasthan, and Andhra Pradesh from "water scarcity" to "water positive" by boosting groundwater levels and improving water availability. The recharged tanks and farm ponds also brought increased revenue through fishery and organic farming. Overall, through this project, BPCL has created a significant difference in the lives of beneficiaries with positive impacts on livelihood generation, groundwater recharge, soil erosion control, and food security. BPCL's goal has been to improve access to water for multiple requirements such as drinking, agriculture, and livelihood, with an emphasis on replenishing groundwater supplies. The primary goal of this effort is to shift settlements from water scarcity to water-positive.

GAIL has implemented comprehensive water conservation and management systems across all its operations to ensure the judicious and circular use of water resources. The company's efforts include planting trees and expanding green cover at numerous GAIL sites. This not only replenishes groundwater levels but also functions as a carbon sink. GAIL's flagship initiative, Arogya, is aimed at boosting water sanitation, and the accessibility and availability of potable water in the rural areas. Solar submersible pumps and UV water purifiers ensure the availability of safe drinking water to students in villages protecting them from water-borne diseases.

5. CONCLUSION

For Indian O&G behemoths, two significant predictive associations are established — that of environmental and social disclosure scores with ROCE as the CFP metric. For the other two CFP

metrics, ROA and ROE, the predictive associations are weak and statistically not significant. Therefore, we have mixed empirical evidence for our hypotheses on environmental and social disclosure foretelling the CFP of O&G sector behemoths. In the absence of tangible statistical evidence for environmental and social performance and disclosure as a predictor of CFP, there is limited potential for using the ESG performance metrics in the two domains as a potential signaling mechanism for financial performance. Even though the empirical evidence is inconclusive, the perspective of sustainability performance and communication as a potential bellwether for financial performance remains pertinent for practitioners, particularly financial analysts, fund managers, investors, and other financial stakeholders. Asserting this theme in a recent report, Hawley and Shen (2023) at Blackrock, the largest investment management fund globally, stated, "The view by many is that sustainable investing is concessionary in that financial results are forgone in order to achieve sustainable outcomes. Our historical analysis shows that this assertion isn't true and that unique ESG data can be predictors of company results".

Furthermore, the empirical findings of this research have several practical implications for company executives entrusted with strategic and financial communication in O&G behemoths. It can be argued that non-financial communication on ESG performance, for example, environmental and social disclosure, deserves independent focus and preparation, and must not be treated as an adjunct or "lesser sibling" to well-established financial communication on the CFP metrics. The growing trend of integrated and sustainability reporting among large corporations globally, taking an array of ESG metrics into account (Oxford Analytica, 2021), provides ample evidence in support of this argument. Another important implication for senior executives and board members, who are required to review and approve substantial corporate investments in environmental- and social metrics-oriented ESG initiatives, is to temper their as well as stakeholders' expectations that committing resources to such initiatives may lead to higher CFP metrics. This may not fructify, and even if it does, can take much longer than anticipated. Therefore, company executives are advised to approach ESG investments with the mindset that, "ESG is its own reward", and also conduct stakeholder communication accordingly.

Based on RTA, three sustainability disclosure themes — circular economy, climate change, and water stewardship — were identified, underscoring the "fault lines" of intersecting environmental and social impacts, on which Indian O&G sector behemoths are laying significant emphasis. However, the author of this study asserts that the practical and policy implications of these "fault lines" are neither restricted to the O&G sector, nor India. While these themes are drawn from sustainability disclosure in the Indian context, they are equally pertinent and applicable to all countries that exhibit a similar socio-economic and environmental context, characterized by a large number of densely-populated human settlements; carbon-dependent economic growth fuelling carbon emissions and pollution; highly populated, water-stressed urban and rural regions; substantial population below the poverty line; and growing socio-economic stress due to fast-depleting water, forest, and other natural resources. Guided by this belief, we have reviewed the list of the 78 Global South countries including India (Finance Center for South-South Cooperation [FC-SSC], n.d.), and concluded that the significant majority of these developing nations, if not all — typically in Africa, Latin America, and South Asia — demonstrate these characteristics.

Considering this stark Global South reality, the thematic analysis findings assume an urgent, and far-reaching implication for environmental policy planners, business and political leaders, and geopolitical strategists attempting to bridge the Global North-South divide on sustainability and environmental management. Dissecting the dynamics of this divide in global environmental politics, Uddin (2017) observes that the global South wishes to be industrialized and rich like the North. Whereas, the North is concerned about the resultant boost in consumption and environmental degradation in the South and wants these developing economies to adopt stringent environmental norms similar to theirs. The South argues that this is unfair and infeasible, as it would keep them at a competitive disadvantage. Another major bone of contention is that the South considers the North as being largely responsible for climate change in the past and argues that it must compensate for it, while the North advocates global cooperation and equal accountability to achieve carbon emission goals in the future (Clapp & Dauvergne, 2005, p. 391).

The narrative for a shared partnership and cooperation to bridge this North-South divide and address common environmental threats can borrow richly from the three themes identified in this study. While the three "fault line" themes reflect the complex and often conflicting socio-economic and environmental priorities of the Global South — for example, creating livelihood and economic growth opportunities, while reducing carbon emissions — they also address the primary concerns of the Global North, thus creating a common ground between the developing and the developed nations, respectively.

The present study has two key limitations to be considered. The first is its small sample size, owing to only seven Indian O&G companies fulfilling the sustainability disclosure requirements for these research objectives. Despite this limitation, the research findings are pertinent because of two reasons. One, Indian O&G behemoths are gaining increasing traction on the radar of domestic and global fund managers and are being re-rated for their shareholder wealth creation potential (Dole, 2024). This first-of-its-kind research potentially addresses an unprecedented interest and knowledge gap among fund managers, investors, and financial analysts by empirically validating the purported linkages between non-financial (sustainability) communication and financial performance. Two, the thematic content analysis findings, pertaining to the second research objective, may be generalizable to the Indian O&G sector, as a sample size of 6–10 is considered adequate for small projects (Braun & Clarke, 2013, p. 50).

Another limitation of the study is that the panel data duration had to be restricted to

the nine years, 2012–2020. This was due to the inconsistent reporting and availability of sustainability disclosure scores on the chosen companies for the prior periods. Future research can address these limitations by including a bigger sample of diverse cohorts — in terms of countries, industry sectors, and a mix of large, mid-size, and small companies. Another area of future research endeavour could be to study the lag effect of ESG performance on CFP metrics, as that could help us understand how the two interact over the long run, even though there may be a negligible or negative association in the short run. On a related note, the possibility of non-linear relationships between ESG performance and CFP can also be investigated, as there is recent research suggesting an inverted U-shaped relationship and the reversal of positive effects of ESG on financial performance beyond a certain threshold (Teng et al., 2022).

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