

Evaluating ESG Integration and Its Financial Effects in The Indian Petroleum Sector

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INTRODUCTION

ESG comprises “Environmental social governance”. ESG standards encompass a diverse approach that encompasses environmental stewardship, social impact, and transparent governance (Dziadkowiec & Daszynska-Zygallo, 2021). In past few years, global landscape of industry and finance has witnessed a profound shift towards sustainability and responsible business practices (Patel & Aditya, 2024). In this context, initial critical inquiry regarding corporate ESG policies is methodology for evaluating ESG performance. In this regard, ESG scores offer a quantitative assessment of significance of ESG dimensions in corporate management (Clément et al., 2023). Today's global stakeholders were increasingly emphasise sustainability and responsible business practices. Consequently, ESG scores enable investors, stakeholders, and decision-makers to acquire a better understanding of a company's environmental impact, social responsibility, and corporate governance practices. Moreover, integrating ESG factors into decision-making enables companies to more effectively identify and address the risks and opportunities linked to sustainability. (Agoraki et al., 2023).

Influence of ESG ratings on investment strategies is on rise, serving as a critical factor in determinants of investment decisions. (The Economic Realities of ESG PwC's Global Investor Survey, 2021). Significant expansion of international financial markets has resulted in increasing importance of sustainability. Companies must prioritize revenue growth and ensure that they are ethical corporate citizens. Their profitability and endurance are compromised by a variety of risks, including market risk, business risk, and operational risk. However, they can be partially mitigated by engaging in sustainable initiatives (Malik & Kashiramka, 2024). One of the main key sectors of India is, oil and gas industry it plays a vital role in nation's GDP. Corporate environmental governance and the social responsibility will give a more integration to the organizations vision, mission and values. Industries were indicated ESG as scores with their reports like Environmental score (ENVSCO), Social score (SOCSCO), Governance score (GOVSCO) and ESG score. Energy industry's key goal is net zero emission in year of 2050.

♦ **Environmental** – Air quality, Biodiversity, Climate change, GHG emission, Product safety & quality, R&D and innovation, Supplier assessments on sustainability, Water management.

♦ **Social** – Customer satisfaction, Human rights, Diversity & inclusion, Health safety, Talent management, Stakeholders engagement.

◆ **Governance** - Cyber security and data privacy, Economic performance, Business ethics, Transparency and regulatory compliance, safety and security of critical assets.

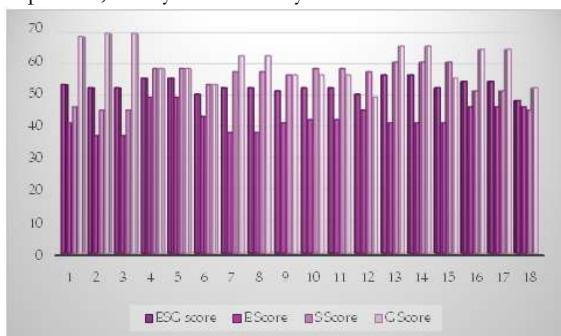


Figure 1: Total output of Environmental social governance scoring in past 3 years of Indian oil and gas companies

Source: (Secondary data)

This investigation discusses about practices of ESG scores and Firm performances of a peer listed oil and gas companies namely,

- i) Reliance Industries
- ii) Indian oil corporate limited
- iii) "Bharat petroleum corporate limited(BPCL)
- iv) Hindustan petroleum corporate limited(HPCL)
- v) Mangalore refinery and petrochemicals limited(MRPL)
- vi) Chennai petroleum corporate limited

ESG score demonstrates environmental score [ENVSCO], social score[SOCSCO], governance score [GOVSCO] and total ESG score (ESGSCO) to calculate company's sustainability performance. Financial performance indicates return on equity (ROE) return on capital employed (ROCE), as well as return on asset (ROA)," calculate firm's performance. Study period is 3 years (2022-2024).

REVIEW OF LITERATURE

In recent years, scholars have increasingly investigated connection between organization's ESG (environmental, social, and governance) practices and its financial performance. One important area of focus is whether act of divulging ESG-related data positively affects financial outcomes. Central argument suggests that organizations committed to transparent ESG reporting-and that actively engage in CSR (corporate social responsibility)-are more inclined to incorporate sustainability into their operations. This integration can potentially drive long-term value creation, enhance market positioning, and improve stakeholder trust(Branco & Rodrigues, 2006; Bui et al., 2020). As environmental concerns continue to escalate, oil and gas sector-known for its an impact upon climate dynamics-is facing increased scrutiny. Sustainability has become a key concern among decision-makers, regulators, and investors who are pushing for more responsible practices across the industry. (Orazalin and Mahmood, 2018; Orazalin et al., 2019; Ramírez-Orellana et al., 2023). Consequence is that oil and gas companies are currently considering a variety of factors, encompasses energy consumption, water pollution, social interventions, changes in land use, and carbon emissions.

who are pushing for more responsible practices across the industry. (Orazalin and Mahmood, 2018; Orazalin et al., 2019; Ramírez-Orellana et al., 2023). Consequence is that oil and gas companies are currently considering a variety of factors, encompasses energy consumption, water pollution, social interventions, changes in land use, and carbon emissions.(Heim et al., 2023; Tamala et al., 2022). Corporations must embrace sustainable practices and models that cover the three key areas of environment, social, and governance to achieve long-term success. (Lai et al., 2021). In past few years, there has been an rising scrutiny of India's oil and gas sector, driven by rising concerns over its environmental and social impact. Regulatory bodies, investors, and public are all exerting pressure on companies in sector to align with responsible business practices as awareness of sustainability issues continues to increase. This has resulted in a more resolute dedication to incorporation of ESG considerations into corporate strategies and operations. (Cardoni et al., 2019). To address these challenges, oil and gas corporations in India implement more comprehensive and transparent method to environmental social administration. This may involve collaboration with policymakers, NGOs, and local communities to develop more robust and sustainable development frameworks that are accountable (Lai et al., 2021) ("The Oil and Gas Industry in Energy Transitions," 2020) (Garbie & Shaqsi, 2019). For example, certain Indian oil and gas companies have invested in renewable energy projects, like wind and solar energy, as a way to remove their carbon footprint and diversify their energy portfolio. Additionally, many companies have implemented sustainability workshops and programs to engage with local communities and resolve their concerns, thereby fostering a more collaborative and inclusive approach to development. (Lai et al., 2021).

ESG in India

ESG is evolved in before two decades. In 2007 national voluntary guidelines were introduced ESG. India is first country, while CSR (Corporate social responsibility) is mandatory for listed companies, formally, ESG is also being adopted. Companies Act 2013 made 2% of average net profit is compulsory requirement for CSR activities. (SEBI) Securities Exchange Board of India introduced (BRSR) Business Responsibility and Sustainability Report for listed organizations. In 2017, SEBI made; Business Responsibility Report (BRR) requirement expanded to include **top 500 listed companies**. Adoption of ESG principles has gained prominence as a strategic imperative for organizations, as it contributes to strengthening stakeholder confidence, managing exposure to various risks, and ensuring adherence to regulatory frameworks in an increasingly sustainability-focused environment(McKinsey, 2020). In 2023 SEBI introduced **ESG rating providers** and encouraged **assurance-based ESG disclosures**, increasing transparency in ESG reporting. National guidelines on responsible business conduct (NGRBC) are circulated by ministry of corporate affairs.

In past 20 year's companies report of ESG is in geometric growth. Stakeholders, investors are seeking attention in Sustainable responsibility towards environmental society.

Because of climate changes government, investors, stakeholders, customers are mainly focusing the ESG activities of a companies. The climate change key note is

high level of carbon dioxide and greenhouse gases (GHG). 70% of GHG emissions come from industrial activities such as energy, transport and etc. India's principal target is to achieve net zero emissions by 2070. Nearly 90 per cent of organizations believe ESG report are increasing their brand values. In sustainability development, Indian companies were mostly concentrated in quality education, good healthcare, sustainable cities, affordable clean water and energy and some social initiatives.

Objective

The aim of paper is to investigate overall consequence of ESG's three main pillars on financial performance. ROA, ROE and ROCE metrics indicate financial performance of Indian NSE 500 index listed companies. In this study top peer oil and gas corporations were taken to investigate impact of ESG and financial performance for time period 2022-2024. To analyse impact of ESG scores on financial performance of Indian petroleum corporations.

Research Hypothesis

H01: ESG score factors do not have a significant negative impact on a firm's Return on Assets (ROA).

H02: ESG score factors do not exhibit a significant negative influence on Return on Capital Employed (ROCE).

H03: ESG score factors are not significantly and negatively associated with Return on Equity (ROE).

Investigation method

This investigation utilizes an exploratory research approach to investigate how ESG scores impact oil and gas corporations' financial performance in India. Data for this analysis was sourced from Crisil ESG scores for years 2022-2024. Totally six firms were chosen for study, firms were chosen in manner of peer listed companies and data availability in Crisil. Pearson's correlation and regression are statistical tools that are employed to evaluate relationship between financial efficiency and ESG ratings. The financial performances are taken in company's annual observations. Annual observations were observed in companies' official websites.

Regression: Regression analysis is used for aim of determining relationship between dependent and independent variables. This study examines ESG scores with financial performance (ROA, ROE, ROCE) Measure strength and direction of relationship among variables for forecasting future outcomes.

Correlation: Pearson's correlation analysis is utilized to check relationship of ESG score, ENV, SOC, GOV, among ROA, ROE, ROCE.

Constraints of the Study

The study's sample may not be larger. Due to limitations in data availability and also sample size is too small; the study analysis was covered to (FY 2022 to 2024) three years' time period with 6 industries. Sustainability growth is still developing in India. These areas will be prioritized for future investigation. Although ESG remains a relatively recent development in the corporate landscape, a substantial body of research has already emerged, examining its influence on firm performance and corporate valuation (Fatemi, 2018).

Analysis and Interpretation

4.1 Variable Description

Table 1 Variable Description

VARIABLE	PERFORMANCE INDICATOR	CONDENSED TERM	VARIABLE
Environmental social governance Score	E Score + S score +G score /3 = ESG Score	ESG	Independent variable
Return on Asset	Net Income/Total Asset	ROA	Dependent variable
Return on Equity	Net Income / Total Shareholders' Equity	ROE	Dependent variable
Return on Capital employed	Earnings Before Interest and Taxes (EBIT) / (Total Assets - Current Liabilities)	ROCE	Dependent variable

Source: (Secondary data)

Table No.1 represents that, ESG performance (ESG score) regarded as independent variable. Respectively, Financial performance indicated as dependent variable, which is ROA, ROE, ROCE.

4.2 Descriptive statistics

Descriptive statistics reveals that, ESG Score represent 52 % stable score among E, S, G score. ESG shows moderate variation with the (G) governance scoring the high, low in (E) environmental scoring, and social scoring is nearest value to ESG score. Skewness and Ex. Kurtosis indicating more companies have lower values and the negative performance in ESG scoring. In financial performance metrics, Comparatively ROA has a low mean value with ROE and ROCE. ROE and ROCE exhibit high variability. ROA has right skewed. Overall, the ESG score is in stable. Firm metrics shows significant dispersion. Firm performance is in disparate outcome level across companies.

Table 2 Summary Statistics, using the observations 1 - 18

Variable	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	Ex. kurtosis	IQ range
ESG score	52.556	52.000	48.000	56.000	2.1481	0.040873	-0.096649	-0.41361	2.5000
E Score	42.389	41.500	37.000	49.000	3.7595	0.088691	0.27523	-0.87221	5.7500
S Score	54.167	57.000	45.000	60.000	5.5757	0.10294	-0.70724	-1.0425	8.2500
G Score	60.056	60.000	49.000	69.000	6.0922	0.10144	-0.69645	-1.1181	9.2500
ROA	7.216	6.7950	-5.8000	22.300	6.1071	0.84632	0.48291	1.0761	4.6850
ROE	21.136	20.415	-32.380	56.260	20.115	0.95168	-0.66618	1.0858	27.485
ROCE	20.353	17.750	-12.070	55.500	15.566	0.76482	0.28175	0.21888	21.405

Source: (Secondary data)

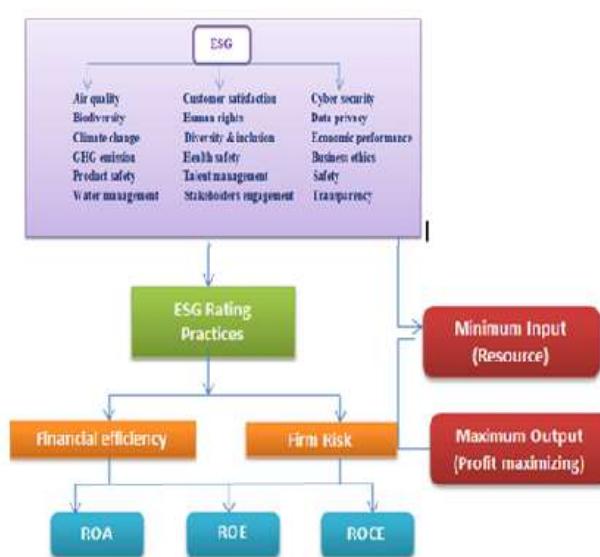


Figure 2 Computation of ESG with Firm performance (Compute by author)

Table 3 Correlation coefficients, using the observations 1 – 18 5% critical value (two-tailed) = s 0.4683 for n = 18

	ESG score	E Score	S Score	G Score	ROA	ROE	ROCE
ESG score	1.0000	0.1611	0.3945	0.5549	-0.1492	0.0986	-0.0814
E Score		1.0000	0.1595	-0.4710	0.2584	0.3005	0.3343
S Score			1.0000	-0.3778	-0.2090	-0.0305	-0.1236
G Score				1.0000	-0.1186	-0.0318	-0.1375
ROA					1.0000	0.8565	0.9528
ROE						1.0000	0.9145
ROCE							1.0000

Source: (Secondary data)

The above table investigates that, correlation coefficient between variables. Firm performance and ESG Score are significant and a positive relationship it may increase the profitability. Firm performance of (ROA), (ROE), and (ROCE) shows highly correlated. Social and Governance score are in weak relationship but it will not affect the profitability of a firm.

Table 4"Model 1: Pooled OLS, using 18 observations Included 6 cross-sectional units Time-series length = 3 Dependent variable: ROA

	Coefficient	Std. Error	t-ratio	p-value
Const	29.5068	36.9653	0.7982	0.4364
ESG score	-0.424136	0.702803	-0.6035	0.5546

Mean dependent var	7.216111	S.D. dependent var	6.107139
Log-likelihood	-57.39415	S.E. of regression	6.224648
R-squared	0.022256	Akaike criterion	118.7883
Sum squared resid	619.9400	Adjusted R-squared	-0.038853
F(1, 16)	0.364202	P-value(F)	0.554641
Rho	0.152515	Hannan-Quinn	119.0338
Schwarz criterion	120.5690	Durbin-Watson	1.205800

Source: (Secondary data)

This study examines whether ESG scores influence a company's Return on Assets (ROA) using pooled OLS regression across multiple firms over three time periods. Outcomes illustrate that Although there is a minor negative correlation between ROA and ESG scores, influence is not statistically significant ($p=0.5546$). Additionally, model does a poor job of explaining ROA variations, with R-squared value of only 2.23%. The F-statistic (0.3642, $p = 0.5546$) further confirms that the overall model lacks significance. There is also mild autocorrelation (Durbin-Watson = 1.2058), but it is not a major concern. Given these findings, pooled OLS may not be the most suitable approach for analyzing this data. Alternative models like Fixed Effects or Random Effects should be considered, along with inclusion of additional relevant variables to improve explanatory power.

Table 5"Model 2: Pooled OLS, using 18 observations Included 6 cross-sectional units Time-series length = 3 Dependent variable: ROE

	Coefficient	Std. Error	t-ratio	p-value
Const	-27.3825	122.529	-0.2235	0.8260
ESGscore	0.923187	2.32958	0.3963	0.6971

Mean dependent var	21.136111	S.D. dependent var	20.11480
Rho	0.071121	S.E. of regression	20.63285
R-squared	0.009720	Durbin-Watson	1.389405
F(1, 16)	0.157045	Adjusted R-squared	-0.052173
Schwarz criterion	163.7103	P-value(F)	0.697127
Log-likelihood	-78.96477	Akaike criterion	161.9295
Sum squared resid	6811.433	Hannan-Quinn	162.1751

Source: (Secondary data)

Results indicate that ESG scores don't have significant impact on dependent variable. Model explains very little variation ($R^2 = 0.0097$), and relationship between ESG scores and outcome is weak ($p = 0.6971$). Additionally, overall model lacks significance ($F\text{-statistic} = 0.157$, $p = 0.6971$), and intercept does not contribute meaningfully ($p = 0.8260$). There is slight positive autocorrelation (Durbin-Watson = 1.3894), but it is not a major issue. Since model does not provide strong insights, exploring alternative approaches like Fixed Effects or Random Effects and including additional relevant variables may help improve the analysis.

Table 6"Model 3: Pooled OLS, using 18 observations Included 6 cross-sectional units Time-series length = 3 Dependent variable: ROCE

	Coefficient	Std. Error	t-ratio	p-value
Const	51.3710	94.9685	0.5409	0.5960
ESGscore	-0.590198	1.80559	-0.3269	0.7480

Mean dependent var	20.35278	S.D. dependent var	15.56613
R-squared	0.006634	Adjusted R-squared	-0.055452
Sum squared resid	4091.850	S.E. of regression	15.99189
Log-likelihood	-74.37832	Akaike criterion	152.7566
F(1, 16)	0.106846	P-value(F)	0.748001
Rho	0.455015	Durbin-Watson	0.863388
Schwarz criterion	154.5374	Hannan-Quinn	153.0022

Source: (Secondary data)

Results suggest that ESG scores have no significant influence on dependent variable. While coefficient is slightly negative (-0.5902), the high pvalue (0.7480) suggests that this relationship lacks statistical significance. Additionally, model's explanatory power is exceedingly low, with R-squared of just 0.0066, meaning it explains almost none of variation in dependent variable. Model as a whole is not significant statistically ($F\text{-statistic} = 0.1068$, $p = 0.7480$), and the intercept (51.3710, $p = 0.5960$) also does not provide meaningful insights. Additionally, positive autocorrelation is present (Durbin-Watson = 0.8634, $Rho = 0.4550$), which may suggest inefficiencies in the model. Given these weak findings, it may be beneficial to consider alternative models like Fixed Effects or Random Effects, or incorporate additional relevant factors to improve the explanatory power of the analysis.

CONCLUSION

Over the past decades, ESG consideration in various sectors, especially high-impact industries like Petroleum industry. It addresses their environmental and social green governance footprint. That's why goal of investigation is to investigate correlation between ESG and financial performance in Indian Oil and Gas Corporations. Financial performance is indicated as ROA, ROE, and ROCE. Peer listed Oil and Gas Corporation of India and also listed in NSE, namely Reliance Industries, Indian Oil corporate limited, BPCL, HPCL, MRPL, Chennai Petroleum Corporation Limited from the year of (2022 - 2024). This research aimed to accomplish the main objective hypotheses to investigate ESG score with firm performance.

Indian oil and gas corporations prioritize corporate environmental stewardship, responsibility, green governance and sustainable investing. Findings have examined there is no significant it gives a moderate variation. And in past three years of financial years ESG score implies in average of 52%. Result indicates not fully of positive and not in full negative it revealing in moderating result. In future, outlook oil and

gas industry will prioritize sustainability and eco-friendly operations. Many of the bold steps were forwarded in ESG initiatives. Overall, the study indicates not only the ESG moderation and also the positivity of firm performance. Corporate performance is in positive reflection. ESG score thus not impact more in firm performance. ESG will brand the industry's value and stakeholders' responsible investment. Research gap of study is, many of previous studies have taken ROA and ROE only for the firm performance here, ROCE (Return on capital employed) is also chosen to analyse the financial performance with ESG score.

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