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Environmental Factors and Financial Performance in Sensitive Sectors of India

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ABSTRACT

This scholarly article seeks to examine the effects of Environmental Factors on the financial performance of a cohort of cement companies listed on Indian stock exchange NSE. Within the cement sector, variables such as energy efficiency, greenhouse gas emissions, exert significant effects on both profitability and market value. This investigation aspires to dissect the association between the Enivronmental dimensions and financial performance, clarifying the influence of sustainability practices, on investor confidence and overall sectoral advancement during the timeframe of 2020 to 2024. Utilizing a quantitative framework through the application of rigorous panel data regression models, the empirical findings indicate that energy inefficiency adversely affects financial performance, underscoring the necessity for sustainable operational practices. GHG have a positive correlation with firm performance. long-term assets exhibit mixed impacts—favorable for market valuation but adverse for return on assets (ROA) and return on equity (ROE). Market valuation is significantly shaped by the asset base.

Keywords: Environmental Factors, Sensitive sectors, financial performance, Indian Cement firms

INTRODUCTION

The purpose of Business plays a central role in the modern and constantly evolving landscape its main aim is to generate profit; however, this concept of profit maximization has undergone significant transformation over time. The relationship between ESG (Environmental, Social, and Governance) factors and financial performance is increasingly recognized in investment strategies. Urwin (2010) suggest ESG metrics are essential for evaluating a company's performance and its potential impact on financial returns, as they highlight issues that significantly affect financial materiality. Integrating ESG factors into investment decisions not only enhances financial performance but also reduces risk, aligning with the growing trend of sustainable investing. High-quality ESG reporting fosters transparency and accountability, which can improve a company's reputation and ultimately its financial outcomes. Soyka et al (2012) finds investors seek to align their values with their investments, the positive correlation between ESG practices and corporate financial performance becomes more evident, suggesting that companies prioritizing ESG issues may achieve better long-term financial results. The growing focus on Environmental, Social, and Governance (ESG) evaluations has precipitated the establishment of numerous rating frameworks by entities such as Bloomberg, Refinitiv and CRISIL. Nonetheless, a considerable challenge emerges from the absence of consistency in rating methodologies, which results in discrepancies in sustainability assessments and complicates cross-comparative analyses. This lack of uniformity represents a significant void in ESG scholarship, as investors and stakeholders encounter difficulties in extracting actionable insights from divergent rating systems. In an effort to mitigate this concern, this research employs the Business Responsibility and Sustainability Reporting (BRSR) framework, formulated by the Securities and Exchange Board of India (SEBI), as a cohesive methodology for sustainability disclosures. The BRSR is structured to align with international ESG benchmarks while accommodating the regulatory and commercial context of India.The research offers a systematic framework for synchronizing ESG assessments, thereby facilitating more coherent decision-making for investors, policymakers, and corporate entities. Garcia et al., (2017); Miralles-Quirós et al., (2018) suggests sensitive sector are those, whose operations can harm the

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environment or natural society, resulting in varying demands from stakeholders for sustainability disclosure based on the nature of their activities. These firms recognize the importance of environmental preservation and implement measures to reduce their negative impact. A key characteristic of such companies is the structured management of their environmental activities, working towards improving environmental performance. A study by Welbeck et al., (2017); Manes-Rossi et al., (2018); Miralles-Quirós et al., (2018), finds that ESS Sector firms face greater stakeholder pressure and stricter disclosure requirements. Garcia et al., (2017) identified Firms in sensitive sectors disclose more information compared to those in non-sensitive due to the higher risks associated with social and environmental concerns. For instance, Kumar et al. (2021a) found that companies in the ESI sector, as listed in the Nifty 100, disclose more information than those in non-sensitive sectors. In addition to legitimization, Welbeck et al., (2017) founds driver for increased sustainability disclosure in sensitive industries is the need to comply with legal obligations.

1.1 Regulatory Framework and Environmental Categorization in India

Since 1988, India has systematically enhanced its corporate sustainability and environmental governance framework. The initial phase involved the implementation of obligatory energy conservation disclosures, subsequently advancing through initiatives such as the Pollution Index (PI), National Voluntary Guidelines (NVG), and Business Responsibility Reports (BRR). Significant milestones encompass the enactment of the 2014 Companies Act, which mandates a minimum of 2% Corporate Social Responsibility (CSR) expenditure for qualifying enterprises, SEBI's 2017 advisory on integrated reporting, and the 2019 expansion of BRR to encompass 1,000 publicly listed companies. In 2020, the Business Responsibility and Sustainability Reporting (BRSR) framework was launched, and by 2023, SEBI issued a mandate for top 175 listed Companies by market capitalization to disclose essential Environmental, Social, and Governance (ESG) metrics, thereby promoting enhanced transparency and accountability in sustainable business operationsi.

1.2 Problem statement: - A significant number of individuals contend that sustainability adversely affects profitability, perceiving it merely as an expense. Nevertheless, neglecting this paradigm can result in monetary penalties, damage to reputation, and operational inefficiencies. This research investigates the influence of environmental, social, and governance (ESG) practices on financial performance metrics—namely, return on assets (ROA), return on equity (ROE), and market capitalization—within the context of firms listed on the National Stock Exchange (NSE) in India, specifically in the cement sectors.

1.3 Research Questions: -

RQ1: How does Environmental Factors Impacts firm financial performance on sensitive sectors of India?

1.4 Objectives:

Our research will analyze how environmental, social, Governance factors influence financial outcomes particularly focusing on industries with high environmental impacts that is focusing on cement sector.

To Analyze the impact of financial performance of firms based on environmental performance through developing a model.

To find the relationship between the environmental factors and financial performance of Indian sensitive Firms.

2.Previous Literature Regarding the Influence of Environmental Factors on Firm Performance

The theoretical framework of effective management posits that superior management practices are intrinsically linked to corporate social performance, thereby fostering enhanced relationships with stakeholders and ultimately contributing to the overall success of the business. A complementary notion, the natural resource-based view, posits that enterprises can secure long-term competitive advantages by strategically leveraging resources and capabilities in an environmentally sustainable manner. Lee et al. (2014) underscored that environmental performance has a favorable impact on return on common equity (ROE) and return on assets (ROA) within Korean corporations. Makridou et al (2020) found that the reduction of CO_2 emissions and allowances positively correlates with corporate profitability. Smaller firms exhibiting higher labor efficiency and reduced energy intensity tend to realize superior financial returns compared to their counterparts characterized by lower productivity and elevated energy consumption. In the realm of environmental accounting, research conducted by Obiora et al., (2022) reveals a

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substantial positive effect on financial performance. Rath et al. (2023) discovered that ESG disclosure scores augment the pay-performance relationship for chief executive officers, although this effect is attenuated by adverse influences stemming from greenhouse gas (GHG) emissions and energy usage disclosures. Suteja et al., (2023) found that investment decisions had a negative effect on firm value. This means that when companies made certain investment choices, their value actually went down instead of up. while investigations concerning Indonesian non-financial sectors suggest a direct correlation between emission performance and corporate valuation by Nababan et al., (2023). Benkraiem et al. (2023) further validated that the mitigation of GHG emissions and the promotion of green innovation exert a beneficial influence on the financial performance of corporate venture capital entities. Concurrently, Elmonshid et al. (2024) ascertained that the efficiency of financial institutions negatively influences CO2 emissions. Investigations concentrating on the energy sector in Indonesia by Harits et al, (2024) indicate that financial and environmental performance, in conjunction with company size, affect the disclosure of carbon emissions. Nguyen-Phung (2024) reported a detrimental effect of GHG emissions on financial performance. Previous research by Al-Mulali (2012) emphasized the significant role of energy consumption in propelling economic and financial growth. In terms of water utilization, Zhou (2018) established that water disclosure heightens corporate risk-taking in industries with elevated water risks in China, whereas Zeng (2020) identified an inverse relationship between water disclosure and systematic risk within Chinese firms. Research by Iwata et al ,(2011) finds waste emissions indicate minimal financial repercussions, with reductions in GHG emissions being associated with enhanced financial performance. Henceforth, based on the particularities of the Sensitive sector ie cement sector the following hypotheses are postulatedH1: There is significant relationship between Environmental factors to financial performance

METHODS

3.Research Methodology

The research methodology adheres to an exploratory and quantitative research framework, utilizing panel data analysis from 2019 to 2024 to evaluate the influence of environmental GHG emissions, water, waste, and energy on the financial performance of sectors sensitive to environmental considerations namely Cement sectors stocks namely UTCEM , ACEM , SRCM , JKCE , ACC , DALSHARA listed in NSE & others listed doesn't have data. At the firm level is examined over a five-year timeframe utilizing purposive and stratified sampling methodologies. Data is gathered from Bloomberg Terminals provided by woxsen university. This methodological approach guarantees a thorough comprehension of corporate environmental performance in relation to financial metrics

3.1. Description of Variables: Table I shows the declaration of variables that are taken for the study

Table I

Variables	Description	Measurements	References	Type
Variables Regarding Environmental Factors				
ROA	Return on Assets	% of Average of Total Assets	Kumar and Firoz (2022);Nguyen, Hoang, and Tran (2022); Galant and Cadez (2017)	Dependent
ROE	Return on Equity	% of common capital	(Moon & Min, 2020), (Fan et al., 2017) (Iwata & Okada, 2011)	Dependent
Firm Value	Market Value	Current share price *Total	(Ionescu et al., 2019)	Dependent

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		number of outstanding shares		
Variables Regarding Environmental Factors				
TWU	Total water Use	Meter cube per year	(Simionescu et al., 2020)	Independent
TW	Total Waste	Tonnes per Year	(Simionescu et al., 2020)	Independent
TEC	Total Energy Consumption	Mwh/gi	(Simionescu et al., 2020)	Independent
GHG	Green Houses Gas	Tonnes per year	(Cucchiella et al., 2017) (King et al., 2002)	Independent
Control Factors				
NOE	Number of employees	Total number of employees	(Becker-Blease et al., 2010)	Control
TA	Total Assets	Total Assets	Maji and Lohia, 2023;	Control

Source: -self complied

3.2 Quantitative framework: -

$ROA_{it} = \beta_0 + \beta_1 LTWU_{it} + \beta_2 LTW_{it} + \beta_3 LTEC_{it} + \beta_4 LGHG_{it} + \beta_5 LNOE_{it} + \beta_6 LTA_{it} + \varepsilon_{it}$.....(1)

$ROE_{it} = \beta_0 + \beta_1 LTWU_{it} + \beta_2 LTW_{it} + \beta_3 LTEC_{it} + \beta_4 LGHG_{it} + \beta_5 LNOE_{it} + \beta_6 LTA_{it} + \varepsilon_{it}$ .....(2)

$MV_{it} = \beta_0 + \beta_1 LTWU_{it} + \beta_2 LTW_{it} + \beta_3 LTEC_{it} + \beta_4 LGHG_{it} + \beta_5 LNOE_{it} + \beta_6 LTA_{it} + \varepsilon_{it}$ .....(3)

In the above equations β_0 denotes the intercept; β_1–β_{10} are the coefficients to be estimated;ε error term ; i=1 ,2,3,4,5,6 and t-years 2020 to 2024;MV ,TWU,TW,TEC,GHG, NOE, TA ,log have been applied to equate with other variables.

4. Empirical Findings & Discussion

4.1 Descriptive Analysis: -

Table II encompasses descriptive statistics of parameters for an array of variables, including mean, median, mode, standard deviation, skewness, and kurtosis. The mean values indicate that specific variables, such as ROE is 11.778.169 and ROA 6.672 high and LTW of 3.784 and LNOW exhibts low. lower averages. In the majority of instances, the median values closely correspond with the means, signifying a predominantly symmetrical distribution. Nevertheless, certain variables, including LMV and LTA, do not possess a mode, implying that no particular value manifests with greater frequency within their respective datasets. Upon examination of the range, ROE is 18.871 demonstrates the most pronounced variation between minimum and maximum values, reflecting significant discrepancies in observations, whereas LTA is 1.072 exhibits the most restricted range, suggesting enhanced consistency. The minimum and maximum values further elucidate that particular variable, such as LTW is Min: 0.811, Max: 3.683, oscillate within a confined range, while ROE is Min: 2.113, Max: 20.984 reveals considerable disparity. Overall, the dataset consists of both stable and highly variable distributions. While LMV and LTW appear comparatively stable.

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Table II Descriptive Statistics

	ROA	ROE	LMV	LTWU	LTW	LGHG	LTEC	LNOE	LTA
Mean	6.672	11.778	5.745	3.784	1.765	4.215	4.302	3.759	5.459
SE	0.441	0.770	0.068	0.079	0.156	0.056	0.070	0.075	0.054
Median	6.504	12.205	5.670	3.727	1.264	4.187	4.293	3.758	5.386
Mode	9.496	13.796	#N/A	3.849	2.594	4.209	4.309	3.674	#N/A
SD	2.416	4.218	0.371	0.433	0.855	0.309	0.385	0.413	0.298
SV	5.839	17.789	0.137	0.187	0.732	0.095	0.148	0.171	0.089
Kurtosis	-0.353	-0.131	-0.611	-1.095	-0.806	1.513	5.664	10.111	-0.702
Skewness	-0.142	-0.192	0.169	0.420	0.800	0.244	-1.344	-2.125	0.362
Range	9.939	18.871	1.447	1.373	2.871	1.469	2.060	2.319	1.072
Min	1.089	2.113	5.021	3.181	0.811	3.384	2.889	2.045	4.932
Max	11.028	20.984	6.468	4.554	3.683	4.853	4.949	4.364	6.003
Sum	200.17	353.336	172.339	113.510	52.952	126.465	129.074	112.784	163.759
Count	30	30	30	30	30	30	30	30	30

Source: Author's work. Note: for the definition of variables please see table I

4.2 Relationship Matrix :-

Table III States the correlation matrix elucidates the interconnections among various financial and business variables. Return on Assets (ROA) demonstrates a robust positive correlation with Return on Equity (ROE) is 0.740, signifying that profitability at the asset level is intricately associated with returns to shareholders. Additionally, ROA exhibits a moderate correlation with LNOE is 0.426, indicating that employee count and corporate structure may influence profitability. Conversely, the correlation between ROA and LTA is -0.051 is weak, suggesting that total assets do not exert a significant effect on return on assets. Firm size (LMV) manifests a strong correlation with LTA is 0.867, LGHG is 0.848, and LNOE is 0.579, thereby reinforcing the notion that larger firms are generally characterized by greater tangible assets, higher employee counts, and increased greenhouse gas emissions. Furthermore, LTWU and LTEC are positively correlated with LGHG is 0.800, 0.726, suggesting that the technical workforce and the utilization of technology are associated with greenhouse gas emissions. Overall, the dataset underscores essential relationships among financial performance, firm characteristics.

Table III :- Relationship Table

	ROA	ROE	LMV	LTWU	LTW	LGHG	LTEC
ROA	1.000						
ROE	0.740	1.000					
LMV	0.220	0.000	1.000				

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LTWU	0.246	0.036	0.577	1.000			
LTW	0.091	-0.040	0.541	0.643	1.000		
LGHG	0.194	-0.077	0.848	0.800	0.518	1.000	
LTEC	0.084	-0.276	0.692	0.726	0.508	0.840	1.000
LNOE	0.426	0.362	0.674	0.599	0.319	0.629	0.520
LTA	-0.051	-0.264	0.867	0.742	0.706	0.868	0.801

Source: Author's work. Notes: for the definition of variables please see table I

4.3.1 Robust Regression Analysis of Environmental Factors on Financial Performance:

Table IV:- Robust Regression Analysis of Environmental Factors on Financial Performance

Variables	ROA(1)	ROE(2)	MV(3)
LTWU	0.16	0.735	-0.423***
	(-0.09)	(-0.34)	(-5.09)
	(-0.178)	(-2.195)	-0.083
LTW	1.250*	1.895	0.044
	(-2.49)	(-1.96)	(-0.99)
	(-0.501)	(-0.966)	(-0.0446)
LGHG	6.469*	8.256	0.700***
	(-2.37)	(-1.28)	(-4.14)
	(-2.73)	(-6.475)	(-0.169)
LTEC	-0.326	-6.231***	-0.135*
	(-0.46)	(-3.92)	(-2.64)
	(-0.704)	(-1.59)	(-0.051)
LNOE	2.633***	6.359***	0.301***
	(-3.99)	(-4.52)	(-5.01)
	(-0.659)	(-1.407)	(-0.0599)
LTA	-10.50**	-13.94**	0.738**
	(-3.28)	(-2.98)	(-3.24)
	(-3.209)	(-4.677)	(-0.228)
_cons	25.43**	49.84**	-0.264
	(-3.06)	(-3.57)	(-0.44)
	(-8.313)	(-13.98)	(-0.604)
R-sq	0.461	0.583	0.908

Significance ***(1%),**(5%),*(10%)

Source: self-computed, Notes: for the definition of variables please see table I, T value in first parentheses, Robust Standard errors in second parentheses

The examination of equities within the cement sector indicates that initiatives aimed at reducing carbon emissions and investments in human capital serve as pivotal determinants of financial and market outcomes. Although variables related to debt exhibit a minimal impact, the stability of the workforce (LTW) contributes to enhanced asset efficiency, while low greenhouse gas emissions (LGHG) substantially elevate both profitability and market valuation. Energy efficiency (LTEC), while of significance, does not demonstrate immediate financial returns. Control variables underscore the capital and labor intensity inherent in the sector—larger workforce size (LNOE) markedly enhances all financial indicators, whereas extensive asset bases tend to diminish profitability yet exert a favorable influence on market value. A robust regression analysis corroborates the validity of these results, showcasing significant predictive capability, particularly concerning market valuation.

5.Relevance of Study

This research underscores the advantageous implications of sustainable practices on corporate strategy, particularly within resource-intensive industries. It facilitates organizations in harmonizing their environmental objectives with their strategic long-term initiatives, enhances the decision-making processes of investors, informs the formulation of policies, and elevates the quality of sustainability reporting—thereby reinforcing both theoretical and practical insights into the relationship between sustainability and financial performance.

6.Conclusions

In the Indian cement industry, the financial performance is significantly shaped by the capital structure, sustainability initiatives, and workforce productivity. Although long-term debt has the potential to augment profitability, elevated asset intensity presents challenges to profitability even as it enhances market valuation. GHG exerts a favorable influence on market value, whereas energy inefficiency detrimentally affects all financial metrics, underscoring the imperative for sustainable practices. The strength of the employee base considerably amplifies profitability and valuation, while diversity within the board of directors contributes positively to return on equity (ROE).To facilitate growth, cement enterprises should prioritize the optimization of energy consumption and implementation of sustainable strategies while ensuring the efficient utilization of assets.

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