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Environmental factors and financial performance: Evidence from the Indian cement industry

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ABSTRACT

This investigation explores the influence of environmental determinants on corporate performance within the Indian framework, concentrating specifically on the cement industry, an area frequently neglected in the literature pertaining to Environmental, Social, and Governance (ESG) despite its considerable ecological impact. Although there has been a proliferation of global research on sustainability, a deficiency of targeted and definitive evidence persists, especially in emerging markets such as India. To address this, our study used data from 2013 to 2022 from 15 prominent cement firms listed on the National Stock Exchange (NSE), utilizing secondary data acquired from the Bloomberg database and Smart PLS as analysis tools. We applied Structural Equation Modelling (SEM) in conjunction with a bootstrapping method consisting of 5,000 resamples. The examination demonstrates that environmental performance metrics exert a significantly negative effect on corporate performance. Furthermore, capital expenditure reveals a negative indirect influence on enterprise valuation. Environmental disclosures positively affect enterprise value when mediated by sales performance, suggesting that transparency regarding sustainability efforts can bolster both reputation and financial gain. The findings are based on Indian cement firms, underscoring the imperative of integrating sustainable practices into corporate strategic planning.

Contribution/Originality: This research examines how environmental issues influence the financial performance of cement manufacturers listed on India's National Stock Exchange (NSE). The study aims to enhance the reliability and validity of its findings by employing structural equation modeling (SEM) and secondary data, particularly within the context of a developing nation such as India.

1. INTRODUCTION

In a worldwide environment marked by climate change, limited resources, and rising social inequalities, industries with significant environmental and societal impacts are increasingly subjected to thorough scrutiny. Within these construction sectors, cement firms play a crucial role in infrastructure development and stand at a critical juncture. Cement, a ubiquitous binding material, forms the vital groundwork for infrastructure projects on a global scale. While cement production is indispensable to the global construction sector, it concurrently represents a significant environmental risk, contributing to 7% of global CO2 emissions. The Global Cement and Concrete Association (GCCA) has established an objective to reduce the cement industry's CO2 emissions by 20-25% by the year 2030, emphasizing the transition towards a low-carbon future. International collaboration is imperative, particularly with China, which accounts for 60% of worldwide cement production (Barbudo, 2016). The industry is proactively engaged in endeavors to diminish carbon emissions, highlighting the critical need for technological

advancements. This review acknowledges the extensive utilization of concrete due to its cost-effectiveness and versatility but underscores the pressing requirement for significant emissions reductions within the cement sector, a principal contributor to CO2 emissions (Barcelo, Kline, Walenta, & Gartner, 2014). With the fifth-largest GDP globally, India is emerging as a hub for rapidly accelerating urbanization and infrastructure expansion, engendering substantial demand for cement. The cement sector, recognized as the second-largest producer worldwide, significantly influences the nation's GDP, employment, and overall infrastructure development. However, the pressures exerted by investors and environmental apprehensions are necessitating a shift toward ethical business practices, which has propelled Environmental, Social, and Governance (ESG) considerations to the forefront of industry priorities. The sector confronts various challenges, including pollution, resource exhaustion, population displacement, volatile raw material prices, and intense competition. Stringent environmental regulations and policy modifications, encompassing carbon reduction objectives, present both obstacles and prospects for transformative industry practices.

The cement industry is continually engaged in experimental endeavors concerning new business models, technological innovations, and digital transformation in response to the increasing demand for sustainable production methodologies and industrial progress. Recently, scholarly literature has emerged that presents conflicting findings; for instance, within Pakistan's cement sector, certain research suggests that firm size does not exert an influence on leverage. Nevertheless, the analysis underscores the substantial effect of alternative independent variables, such as asset tangibility, profitability, and growth, on the configuration of capital structure. These determinants serve as pivotal factors, elucidating the intricate dynamics of leverage decision-making within the Pakistani cement industry (Hijazi & Tariq, 2006). Conversely, an alternative study identifies a positive and statistically significant correlation between capital structure and profitability within the Nigerian cement sector. The findings emphasize the significance of capital structure as a driver of profitability and the potential advantages associated with debt financing. The research advocates for the enhancement of debt financing strategies, given that capital structure positively influences profitability and debt facilitates profit generation within the Nigerian cement industry, thereby informing financial strategies in the sector (Anyakwu, 2022). The current analysis advances beyond prior research by adopting a comprehensive approach, meticulously addressing the multifaceted challenges encountered by the cement industry in its quest to achieve equilibrium among economic sustainability, technical adeptness, and environmental responsibilities. The discourse acknowledges the vital role played by stakeholders who prioritize environmental considerations, recognizing their considerable influence on investment decisions and market evaluations. The investigation underscores the imperative for organizations to uphold responsible, transparent, and sustainable practices as a fundamental strategy for attaining enduring growth. Moreover, the study contributes uniquely by introducing innovative elements into the examination, specifically through the dynamic assessment of the interplay between capital expenditure and sales concerning firm value. This pioneering methodology fills a gap in the academic literature, thereby enhancing our understanding of the complex interplay of various factors within the specific context of the Indian cement industry.

Unlike the previous tests into the cement industries of Pakistan and Nigeria, this latest research is distinguished by a detailed evaluation of environmental elements in combination with financial concerns within the Indian setting. The cement sector operates in a complex context, striving to strike a balance between economic sustainability, technical advancements, and environmental obligations. Environmental issues may not have a direct impact on the organization or its investment portfolio, but they significantly impact important stakeholders such as customers, consumers, suppliers, and shareholders. Stakeholders who care about environmental, social, and governance (ESG) principles are increasingly demanding accountability, transparency, and environmentally friendly procedures from firms, influencing investment decisions and market values. This paper explores the complex interaction of environmental and financial issues that drive the Indian cement industry.

It critically explores the industry's different ESG concerns and focuses on potential solutions and innovation opportunities. The research provides critical insights for organizations to navigate the environmental, social, and governance (ESG) landscape and achieve long-term success by evaluating financial repercussions and investor viewpoints. This study adds to the larger discussion on responsible business behavior, sustainability in the environment, and stakeholder involvement in India. The cement firm, as a key component of the worldwide construction industry, has a substantial impact on both economic growth and infrastructural development. With a growing emphasis on environmentally friendly procedures, ethical governance, and financial stability, understanding the convergence of ESG and financial issues is critical in today's corporate environments. Environmental criteria consider the ecological impact and stewardship of a company's operations. The goal of this study is to assess the significant consequences of ESG variables, particularly environmental elements, in the cement industry, with an emphasis on their impact on crucial financial measures such as capital expenditures, sales revenue, and company value. Additionally, the study will examine how environmental factors might boost sales revenue and firm value in connection with capital investment.

Consequently, the subsequent research inquiries have been articulated to investigate the responses.

RQ1. What is the comprehensive influence of environmental determinants on the valuation of enterprises within the cement sector?

RQ2. How does capital expenditure correlate with sales, and what is its overall impact on the valuation of the firm?

RQ3. To what degree do ecological determinants exert influence over sales within the cement sector, and what is their aggregate effect on corporate valuation?

The goal of this investigation is to explore the relationships between company size and revenue, as well as the impact of environmental factors on firm valuation.

This research entails a comprehensive analysis of the current literature to identify possible gaps and establish clear objectives to fulfill this aim.

RO1. Perform an in-depth examination of the overall influence of environmental elements on corporate value.

RO2. Examine the relationship between capital spending and sales dynamically to understand its effects on the company's valuation.

RO3. Measure the impact of environmental factors on sales and evaluate their consequences for company valuation.

This paper presents a thorough analysis that has not been presented in any other research. A comprehensive analysis has been conducted to understand the influence of environmental factors on the value of the company. Stakeholders are more likely to favor businesses that are environmentally responsible rather than those that do not generate revenue or profits. To analyze the interaction between capital expenditure and sales for company value, a new dynamic analysis has been introduced. This analysis indicates that even if a company has higher capital and sales, stakeholders may still prefer the company to be environmentally friendly, ensuring it does not negatively impact society. Our study describes the research design and methods and deals with a thorough dataset of fifteen leading Indian cement companies over a period of 10 years, sourced from Bloomberg. The use of structural equation path modeling with bootstrapping (5000 resamples) enabled remarkable results and the estimation of standard errors. This targeted approach, focusing exclusively on the dynamic Indian market, provides a solid foundation for examining trends in production, pricing, market share, and regulations. Our study uses Partial Least Squares Structural Equation Modeling (PLS-SEM) to investigate complex relationships in the Indian cement industry and provide valuable insights for academic discourse and industry practice. The quantitative data clearly shows how environmental factors affected sales. This is because companies in the cement industry are required to comply with environmental regulations in a sustainable manner that benefits the company, its stakeholders, and the community at large. By evaluating environmental factors, company value can be increased, and positive effects can be achieved. The

focus of the study on Indian cement companies limits the global generalizability of the results. Too narrow an emphasis on specific metrics can lead to missing important variables that influence the complex relationship between financial performance and the environmental, social, and governance dimensions. Reliance on a specific trend period may limit the study's ability to capture evolving industry dynamics over time, highlighting the need for future research with a broader set of variables, a longer data period, and qualitative factors for a more comprehensive understanding. Therefore, by focusing on these objectives, the study attempts to provide a concise yet thorough, dynamic analysis of the relationships between environmental, capital expenditure, sales, and firm value in the cement industry. This study is organized as follows in order to fill the gap in the research: First, we conduct a review of the literature to ascertain how ESG factors, in particular the environment in the cement sector, affect key financial metrics like capital expenditure, sales revenue, and firm value. Next, we develop hypotheses using our structural equation model. Following a comprehensive methodology section, the results of our empirical investigation are presented. The investigation's primary findings are then discussed. The study's conclusion is completed with significant recommendations for businesses and stakeholders.

Table 1 outlines key studies that have been added to the emerging literature on sustainability and firm performance. It emphasizes ESG factors, demonstrating their influence on financial results related to our study and organizational effectiveness.

Table 1. Reference.

Reference	Objective	Independent variables	Research method	Dependent variable	Results
Prabhakar and Japee (2023)	To analyze financial statements using various profitability ratios and statistical analysis	N/A	Profitability ratios analysis and statistical analysis	Net profit margin ratio	Ambuja Cements Ltd. is more profitable in terms of ratios, whereas ACC Ltd. is more effective in statistical analysis.
Tu, Dai, and Xiao (2022)	To analyze the environmental efficiency of China's cement industry	Industrial output	Non-parametric frontier method	Environment efficiency	Strict environmental supervision increased overall environmental efficiency by 23.9 percentage points.
Akram, Farooq, Akram, Ahad, and Numan (2021)	To understand how firm size can impact profitability in a developing country.	Firm size of total assets and total sales	Multiple regression model	Return on Equity and return on assets	The relationship shows a significantly weak impact compared to that of firm size.
Wang, Xu, and Liang (2021)	To study the impact of environmental regulation on firm performance	Environmental regulation	Differences-in-differences model	Revenue and profit	Environmental regulation has negative impacts on revenue and profit.
Olowookere, Taiwo, and Onifade (2021)	To examine the influence of environmental disclosure practices on the financial performance of cement companies in Nigeria.	Environmental accounting disclosure	F-test and Hausman test	Return on assets and return on equity	Positive and significant impact of environmental accounting on financial performance
Nawaz, Hussain, Noor, Habib, and Omair (2020)	The objective is to assess the key performance indicators of the cement industry.	N/A	Taguchi signal-to-noise ratio method	N/A	The paper assesses the impact of economic sustainability on the cement industry.
Asuquo, Dan, and Effiong (2020)	The study aimed to determine how eco-friendly costs affect the net revenue of firms.	Waste management cost and pollution abatement cost	Ordinary least square regression method	Net revenue	Waste management costs do not significantly affect net revenue.
Ullah, Afgan, and Afridi (2019)	Investigate the influence of corporate governance on financial performance and capital structure.	Board size, board independence, and institutional ownership	Regression analysis	Financial performance and capital structure	Corporate governance positively influences financial performance and negatively impacts capital structure.

2. LITERATURE REVIEW

2.1. Capital Expenditure to Enterprise Value

Capital expenditures encompass the financial resources set aside for the acquisition, renovation, and upkeep of fixed assets such as real estate, machinery, buildings, equipment, or technology. Central to a company's operations is shareholder value, which demonstrates the organization's proficiency in managing capital allocation and creating value. An examination of the cement industry in Bangladesh explores how macroeconomic and company-specific elements influence profitability. The findings suggest that the relationship between capital structure and non-tax protection positively influences profitability, while the cost-to-income ratio negatively affects profitability (Rezina, Ashraf, & Khan, 2020). An analysis of the cement sector in Pakistan reveals that liquidity is advantageous and that by optimizing inventory and working capital turnover ratios, effective working capital management enhances shareholder value. Nonetheless, the effects of the current ratio remain consistent. The hypothesis was formulated based on earlier studies that validated the empirical findings. The aim of working capital management is to achieve a balance between profitability and liquidity (Farooq & Masood, 2016; Shahzad, Fareed, & Zulfiqar, 2015). A related study on the Pakistan cement industry found that capital structure influences profitability. Increased debt leads to lower returns because the level of liabilities in a company's capital structure is inversely correlated with profitability (Ahmad, 2014). This research report examines the relationship between intellectual capital, financing costs, and company value. The results indicate that value added by capital employed, value added by intellectual capital, and the coefficient of intellectual capital all have a negative influence on the weighted average cost of capital but no influence on firm value (Iranmahd, Moeinaddin, Shahmoradi, & Heyrani, 2014). These studies support the claims made by earlier authors that capital is a corporate category rather than an industrial category, and that strategic productivity constraints imposed by absent owners affect accumulation. The paper also presents a new analytical framework that measures accumulation in terms of differences rather than absolute values (Nitzan, 1998). Furthermore, another paper provides empirical evidence of a positive relationship, even in cases of conflict between managers and owners. The study uses residual regression analysis and common factors analysis to support this evidence (Gordon & Iyengar, 1996). It has also been observed that working capital management can increase company value by reducing the working capital turnover ratio and inventory levels. This discussion results in the following multiple-part hypothesis:

H_{1a}: Capital expenditure influences enterprise value through the mediation of sales revenue.

H_{1b}: Capital expenditure impacting enterprise value mediated by the environmental disclosure score.

H_{1c}: Capital expenditure affecting enterprise value mediated by both the environmental disclosure score and sales revenue.

2.2. Capital Expenditure to Enterprise Value Mediated by Sales Revenue

Any purchase of a new asset or any financial contribution to extending the useful life of an existing asset is considered a capital expenditure. An organization's income from selling products or providing services is known as revenue. Accounting information users can benefit from more thorough and decision-relevant information when company value is analyzed based on strategic resources, which contributes to the efficient functioning of the capital market. This article examines the profitability of the Pakistan cement industry, and the results suggest that working capital management significantly increases profitability (Shahzad et al., 2015). According to another study on the relationship between working capital management and profitability in the cement sector of Bangladesh, reducing the number of outstanding sales days can increase profitability and reduce the negative impact of working capital management on profitability (Hoque, Mia, & Anwar, 2015). The influence of working capital management on the profitability of the cement industry is the subject of another study. The results of this study suggest that working capital and profitability are positively correlated (Khaksarian, 2014). The impact of capital structure on financial performance is examined in a study of cement companies in Nigeria. Corporations' operations and expansion trajectories are tightly connected to their finances, with data indicating that these components exert different impacts on their financial metrics, thus promoting a tactical preference for retained profits while considering debt as a

secondary option (Ogbulu, Okanta, & Turakpe, 2018). The drivers include the enterprise's magnitude, cost ratio, typical collection period, inventory turnover, fixed asset turnover, and debt ratio (Dao, Tra, & Nguyen, 2022). This inquiry conducts a rigorous analytical comparison between Ambuja Cement Ltd. and ACC Ltd. using statistical assessments and other profitability factors. The data show that Ambuja Cement Ltd. has superior profitability as measured by the profit margin ratio, EBIT, and EBITDA metrics. In contrast, ACC Ltd. demonstrates improved efficiency in capital gains creation by leveraging its assets to generate profits (Prabhakar & Japee, 2023). This investigation elucidates the effectiveness of the way the Indian cement business manages its receivables, leading to increased sales figures and timely profit realization (Jeyachitra, Bennet, Nageswari, & Parasuraman, 2010). Using secondary data collected over a fifteen-year period, a supplementary investigation into the Indian cement industry identified that technological advancements significantly influence sector efficiency, shaped by parameters like capacity utilization, factory productivity, earnings rates, and cost efficiency (Kumar, John, & Senith, 2013). In contrast to standard cement manufacturing procedures, LC3 cement technology improves production capacity and return on investment while concurrently reducing greenhouse gas emissions by 20-30%, as stated in the conversation about the Cuban cement sector (Díaz et al., 2017). In summary, these studies offer valuable insights into how capital management influences profitability in the cement industry, revealing a positive association between operating capital and financial performance. Additionally, a firm's capital structure plays a crucial role in its financial outcomes, particularly for those relying heavily on debt and retained earnings. Technological advancements also significantly shape industrial performance, with factors such as cost efficiency, profitability ratios, capacity utilization, and production effectiveness serving as primary drivers.

2.3. Capital Expenditure to Enterprise Value Mediated by Environmental Disclosure Score

Capital expenditures refer to the total financial investments made in acquiring, upgrading, maintaining, or modernizing a company's physical assets, such as buildings, equipment, land, and technological advancements. The Environmental Exposure Evaluation represents the overall level of disclosure, measured using data aligned with global standards and deemed most relevant to a specific industry. A company's fair value, enterprise value, or intrinsic worth is shaped by factors like the business environment, ownership stakes, projected cash flows, asset valuations, and employee productivity. This study explores how a firm's value relates to the quality of its voluntary environmental disclosures (Beretta, Demartini, & Trucco, 2018). An empirical analysis of environmental information disclosure in China indicates that these disclosures positively influence high-quality growth, with intellectual capital serving as a mediating factor in the relationship (Jiang, Guo, & Wu, 2021).These studies demonstrate that providing environmental information positively affects a company's valuation and anticipated future cash flows. They emphasize the strong connection between environmental disclosure, capital expenditure, and firm value.

2.4. Capital Expenditure to Enterprise Value Mediated by Environmental Disclosure Score and Sales Revenue

Capital expenditure refers to the funds allocated for acquiring, maintaining, upgrading, or enhancing fixed business assets such as buildings, equipment, or machinery. The assessment of environmental disclosures involves evaluating aspects like energy consumption, carbon emissions, water use, waste management practices, and measures taken by a company to mitigate environmental risks. Sales revenue serves as a key quantitative measure of income generated from the company's core operations. Enterprise value (EV) offers a broader valuation metric than market capitalization, reflecting the total worth of a company. In accordance with the research findings, environmental disclosures appear to exert no discernible influence on financial performance (Deswanto & Siregar, 2018).

Conversely, an alternative study identified a positive correlation between the quality of environmental reporting and financial metrics such as organizational size, capital demands, profitability, and capital expenditures (Ahmadi & Bouri, 2017). This study examines the link between a company's value and the quality of its voluntary environmental disclosures. The results reveal a positive correlation between disclosure quality and anticipated future cash flows,

along with both positive and negative relationships with the firm's cost of equity (Plumlee, Brown, Hayes, & Marshall, 2015). Although earlier studies primarily concentrated on environmental information disclosure, this literature emphasizes the significance and impact of such disclosures in greater detail (Qiu, Shaukat, & Tharyan, 2016). This paper specifically examines the relationship between corporate social performance and financial success by employing both linear and nonlinear models, highlighting governance as the key influencing factor (Nollet, Filis, & Mitrokostas, 2016). Overall, this research suggests that environmental information disclosure improves financial performance and business value, but not profitability.

2.5. Sales Revenue to Enterprise Value

A company's revenue from the sale of products or services is known as revenue. One method for estimating company value is company value analysis, a type of company valuation. The factors include the scope of the company, cost ratio, average collection period, inventory turnover, fixed asset turnover, and debt ratio (Dao et al., 2022). A study on Pakistani cement companies found that, when considering total sales value as a measure of profitability, company size has a mixed impact, both positive and negative (Akram et al., 2021). According to another study on Pakistan's cement industry, operating costs per tonne of cement produced, market share growth, and access to new export markets rank first among key performance indicators (KPIs) to ensure economic sustainability, while community investment and carbon credits rank lowest (Nawaz et al., 2020). On the other hand, a related study on the cement industry in Pakistan revealed that although size, collection period, payment period, and debt ratio have a negative impact on company returns, effective working capital management has a positive impact (Ullah, 2019). In addition to discussing the need for sustainable development based on economic, social, and environmental indicators, research on the cement industry conducted in Bangladesh also examines the impact of macroeconomic and company-specific factors on profitability. The study finds that the relationship between capital structure and non-tax protection positively affects profitability, while the cost-to-income ratio negatively affects profitability (Rezina et al., 2020). The article in Cuba discusses how LC3 cement technology, which reduces greenhouse gas emissions by 20–30% compared to traditional cement production methods, offers a more profitable and environmentally friendly solution (Díaz et al., 2017). This paper evaluates the possible carbon leakage effects and calculates the benefits of carbon trading for the cement industry in different countries. In addition to assessing potential carbon leakage effects, it discusses how the cement industry benefits from revenue and reduces compliance costs through carbon trading (Szabó, Hidalgo, Ciscar, & Soria, 2006). This study makes an analytical comparison of Ambuja Cement Ltd. and ACC Ltd. based on statistical analyses and various profitability ratios. The results show that Ambuja Cement Ltd. is more profitable when considering the net profit margin, EBIT, and EBITDA. However, ACC Ltd. is more efficient in generating capital gains by utilizing assets to generate profits (Prabhakar & Japee, 2023). All these studies lend credence to the idea of examining variables such as operating costs, market share expansion, and access to new export markets that affect the profitability of the cement manufacturing sector.

2.6. Environmental Disclosure Score to Enterprise Value

Enterprise value is often used to determine acquisition prices and in many metrics that compare the relative performance of different companies. The paper provides evidence that higher-quality environmental reporting is associated with effective corporate governance and improved investor perception. The company attributes size to capital requirements, profitability, and capital expenditures, which are positively correlated with the quality of environmental reporting (Iatridis, 2013). The paper found that the quality of voluntary environmental reporting is associated with firm value through both cash flow and cost of equity (Plumlee et al., 2015). The paper found that voluntary disclosure has a positive correlation with the market value of the company, but assurance of such information does not provide additional benefits, focusing on legitimacy theory and stakeholder theory. The observations mainly come from the financial and industrial sectors (Fazzini & Dal Maso, 2016). This study pays

special attention to residues in environmental performance that have no impact on the company's financial and environmental performance values (Deswanto & Siregar, 2018). This study found that environmental information disclosure has a positive impact on the high-quality development of Chinese listed companies and that intellectual capital plays a mediating role in this relationship, which incentivizes companies to improve their environmental information disclosure (Jiang et al., 2021). The paper found that the quality of environmental disclosures has a stronger impact on environmental reputation than quantity disclosures, and it also examined investments in research and development, the diversification of which is a potential technique for improving environmental reputation.

The results indicate that the frameworks and models examined in the original research are based on more recent data. They also argue that the quality, not the quantity, of environmental disclosure has a greater impact on a company's image among investors and executives (Kumar et al., 2013). These articles investigate the link between the quality of voluntary environmental reporting and corporate value, with an emphasis on aspects such as size, capital requirements, profitability, and capital spending. The study also examined investments in research and development to enhance environmental reputation. This discussion leads to the following hypothesis:

H*1a*: Environmental disclosure score to enterprise value mediated by sales revenue.

2.7. Environmental Disclosure Score to Enterprise Value Mediated by Sales Revenue

Environmental disclosure scores have a positive impact on financial performance, while the disclosure scores show a positive relationship with economic performance. Revenue is the income a company generates from the sale of goods or services. Company value is central to financial analysis and affects the interests of all involved. The article examines the connection between corporate environmental disclosure, financial markets, and media exposure. It demonstrates how improved environmental disclosure leads to more accurate earnings forecasts by financial analysts. The impact of environmental disclosure is stronger in Europe than in North America. The effect was smaller for companies with extensive analyst monitoring and in environmentally sensitive industries (Aerts, Cormier, & Magnan, 2008). The paper provides evidence that higher-quality environmental reporting is associated with effective corporate governance and improved investor perception in Malaysian companies. Effective corporate governance is related to the quality of environmental reporting (Iatridis, 2013). Particular attention is paid to the disclosure of environmental issues, and the focus is largely on the disclosure of environmental aspects. Higher disclosures lead to higher market values due to increased expected cash flow growth rates, while environmental disclosures do not show any relationship to profitability (Qiu et al., 2016). The paper evidence also indicates that the quality of voluntary environmental disclosure is related to firm value through both cash flow and the cost of equity capital (Plumlee et al., 2015). It finds that improved environmental disclosure leads to more accurate profit forecasts by financial analysts, which has a greater impact in Europe than in North America. The paper also highlights the relationship between the quality of voluntary environmental reporting and firm value, focusing on cash flow and the cost of equity.

2.8. Capital Expenditure to Sales Revenue

Investments can increase an organization's capacity or efficiency in both the short and long term. Revenue is crucial for companies to generate profits, monetary cash flows, and financial resources, and its analysis must be comprehensive. This article examines the process-related sales of innovations, which are significantly linked to the innovation purchase of capital goods. While the sale of an improved product and the products that are new to the company are particularly affected by expenditure on product research and development. This also implies that sharing innovation inputs is essential to increasing sales of innovative mass-produced products (Sterlacchini, 1998). The article examines the impact of renovation investments on the performance of a hotel property. Innovations in capital expenditures have been shown to have significant short-term positive impacts in terms of increased sales, profitability gains, increased customer focus, and reductions in repair and maintenance costs. However, in the long term, there will be a decline in sales and profitability (Turner & Hesford, 2019). The study states that fluctuations in the current

ratio would have no impact. A consensus has been reached on effective working capital management that can increase profitability. The aim is to manage the trade-off between profitability and liquidity (Shahzad et al., 2015). The study acknowledges that capital structure has a significant impact on profitability in the cement industry in Pakistan. Profitability and a company's level of liabilities in its capital structure have an inverse relationship, which means that an increase in liabilities results in a decrease in earnings. It evaluates the relationship between variables such as the debt-to-equity ratio and return on equity (Ahmad, 2014). The article analyzes the impact of Ohio's state-funded capital grant program on student achievement and housing prices. It addresses the mechanisms through which capital expenditure affects performance, and there is evidence that fluctuations in capital expenditure are correlated with changes in operating expenditure, suggesting that some of these effects may be due to operating expenditure. It is found that after capital expenditure, there are short-term disruptions in student learning, followed by long-term benefits (Conlin & Thompson, 2017). The paper focuses on companies in the cement sector in Pakistan. A positive and significant relationship was found with the value of cement companies, indicating that efficient working capital management leads to an increase in company value (Farooq & Masood, 2016). It focuses on the relationship between expected inflation, real returns, and capital investment, and suggests that the variation in expected real returns is a result of the capital issuance process rather than expected inflation (Fama & Gibbons, 1982). The article highlights the significance of sustainable manufacturing practices, recycling initiatives, and alternative cement formulations in promoting sustainable development. This approach has contributed to pollution reduction through strategies such as retiring outdated plants and implementing desulfurization technologies. It underscores the critical role of eco-friendly manufacturing processes, recycling efforts, and innovative cement compositions in advancing sustainability Shen et al. (2017). Empirical studies show that although short-term innovations boost sales, profitability, and customer engagement, they are often accompanied by declines over the long term. Additionally, the connection between anticipated inflation, actual returns, and capital investment is thoroughly analyzed. The paper highlights the critical role of sustainable manufacturing methods, recycling programs, and alternative cement formulations in promoting sustainable development, alongside the cement industry's dedication to reducing environmental pollution through desulfurization and modernization initiatives.

2.9. Environmental Disclosure Score to Sales Revenue

The environmental disclosure score recognizes the importance of environmental performance and transparency, which significantly impact the economic results of the organization, with both the environmental disclosure score and profitability functioning as mediating variables within this relationship. Sales revenue represents a pivotal element for a corporation as it facilitates the generation of income through the provision of goods and services. The extant literature concerning the cement industry is comprehensive and specifically emphasizes firm characteristics such as capital requirements and profitability. The literature pertaining to the quality of environmental reporting was developed utilizing Ohlson scoring equation methodologies and the Factiva database. The literature review on this subject has underscored the significance of environmental disclosures for stakeholders and the efficacy of corporate governance (Iatridis, 2013). Voluntary environmental disclosure implies that a corporation has the discretion to reveal information regarding its environmental impact. This encompasses data regarding the company's water usage, greenhouse gas emissions, and other environmental considerations. This article particularly emphasizes the interplay between environmental performance and the cost of equity capital (COEC), as well as the evaluative significance of environmental assertions (Plumlee et al., 2015). Numerous studies have investigated how corporations endeavor to sustain their legitimacy through environmental disclosure while addressing the informational requirements of financial markets. Furthermore, it illustrates how the disclosure of environmental information is vital to stakeholders concerning a firm's legitimacy and enhances the contextual framework of the information available to analysts. In contrast to legitimacy theory, information economics is prominent within the literature, and there exists conflicting empirical evidence regarding the correlation between disclosure and environmental performance (Cormier & Magnan,

2015). Taken together, these studies provide important insights into the fact that environmental disclosure has different priorities in Malaysia, exhibits a relationship between firm characteristics and environmental disclosure in Malaysia, and finds a negative association with firm economic performance. This approach allowed researchers to extend an environmental disclosure rating system and examine company characteristics with environmental disclosures (Smith, Yahya, & Marzuki Amiruddin, 2007). This study found the interesting result that financial performance has no influence on environmental information disclosure. The present study uses environmental disclosure with corporate value, financial performance, and environmental performance to analyze using methods such as simultaneous equation modeling and panel data regression analysis (Deswanto & Siregar, 2018).

The study's conclusion demonstrates how industry membership influences environmental disclosure and award prospects. Companies participate in social initiatives to achieve success, and their efforts in environmental management systems (EMS) and stakeholder engagement have contributed to success in corporate environmental awards.

Environmental information disclosure that receives awards and environmental information are not the same across all industries. Methods used include auditing corporate disclosures, financial reporting, and examining corporate websites for environmental reports (Hassan & Ibrahim, 2012). This study highlights the Johannesburg Stock Exchange's mining companies and clearly shows that there is a relationship between corporate sustainability disclosure and return on investment (Wasara & Ganda, 2019). The environmental performance of the cement industry in Vietnam is the subject of this study, which also provides insights into how cleaner production methods can help Brazilian industrial companies meet ISO 14001 certification requirements and improve their environmental performance. Certification has a positive impact on Vietnam's environmental performance while also improving management and operational aspects (Nguyen & Hens, 2015). This study discusses the fact that green costs have no impact on the net sales of cement manufacturers. In addition, the impact of waste management costs and sustainability costs on net sales is discussed. The literature focuses on stakeholder management, information disclosure, and accountability in business. The methods used are an ex-post facto research design and the least squares regression method to determine whether it affects net sales (Asuquo et al., 2020). This study examines a clear relationship between green supply chain practices and environmental performance and competitive advantage in the cement industry. The study shows that green supply chain practices have had a positive impact on environmental performance. The literature pays particular attention to green practices and environmental performance. To understand the relationship between the green supply chain and environmental performance, correlation and structural equation modeling, as well as path analysis, are used with Smart PLS software (Khaksar, Abbasnejad, Esmaeili, & Tamošaitienė, 2016). This study analyzes causal relationships, prioritizes sub-criteria, and effectively proposes a model for evaluating the performance of green supply chain management in the cement industry. This will be useful for performance evaluation in the cement industry. The methods used for performance appraisal are fuzzy decision paths and evaluation laboratory techniques (Kazancoglu, Kazancoglu, & Sagnak, 2018). The evidence presented in this section suggests that the impact of environmental regulations on firm performance in the Chinese cement industry is negative, leading to a decline in sales. This is due to the large elasticity of market demand, which prevents companies from sparing consumers regulatory costs.

The difference-in-differences analytical method is used to demonstrate that a company's operational performance depends on its efficiency and the regulatory costs passed on to customers (Wang et al., 2021).

The environmental efficiency of China's cement industry remains low, showing only modest improvements, although there is significant potential to enhance environmental management effectiveness. Existing research on this topic primarily concentrates on measuring the industry's environmental efficiency. A non-parametric frontier method is employed to evaluate efficiency based on pollutant emissions generated during industrial production (Tu et al., 2022). The findings indicate that the capital structure experienced adverse impacts, whereas corporate governance positively influenced financial performance in a beneficial manner. The capital structure, alongside the financial

performance of the cement industry in Pakistan, is analyzed through regression techniques and the application of SPSS version 21 (Ullah et al., 2019). The paper explores the business context of the national greenhouse gas emissions trading scheme. Research on Chinese cement companies centers on this system, emphasizing the need for training to understand its framework and build capacity for implementing self-mitigation strategies. This study uses the MBDC format approach to assess self-mitigation with the open card technique to evaluate predicted carbon pricing. It also examines the effect of CO2 emissions on financial performance and innovation (Liu & Fan, 2018). Taken together, these studies demonstrate the critical necessity of effective corporate governance and the voluntary disclosure of sensitive environmental information to stakeholders. The research also examines corporate environmental performance and sustainability disclosure, with a focus on environmental efficiency and green practices. It also investigates how CO2 emissions influence innovation and economic success.

2.10. Capital Expenditure to Environmental Disclosure Score

For public sector organizations, capital expenditure is a crucial area as it involves the purchase or renovation of fixed assets such as real estate, buildings, machinery, and equipment. The environmental disclosure score and environmental performance are related to each other, but there is no relationship between social performance and environmental disclosure. This study shows that business attributes such as capital requirements, size, profitability, and capital expenditures are positively related. The study provides evidence that higher-quality environmental reporting is positively related to environmental performance and effective corporate governance. This also shows that high-quality environmental information is value-relevant and improves investor perception. The highlighted literature on informative environmental reporting is valuable to stakeholders, and effective corporate governance is related to the quality of environmental reporting (Iatridis, 2013). Toxic Release Inventory (TRI) data is not the only source of relevant information that voluntary environmental disclosures provide. Different disclosure categories with similar relevance suggest that each category offers insights into management practices related to current environmental strategies. The TRI data correlates positively with the cost of capital, but there is no correlation between the two. In summary, voluntary disclosure of environmental information increases firm value based on the role that disclosures play in predicting financial performance (Clarkson, Fang, Li, & Richardson, 2013). This study finds that there is a positive relationship between the quality of voluntary environmental disclosure and future expected cash flows. There is also both a positive and a negative relationship between the quality of voluntary environmental reporting and a company's cost of equity (Plumlee et al., 2015). The environmental information disclosure policy has reduced the size of industrial firms, and this study identifies key channels through which it impacts firms' export activities.

Exports, particularly to coastal areas, have a higher impact on large, low-productivity businesses and non-state-owned enterprises. This policy affects company exports due to manufacturing costs and budgetary restrictions. The efficiency of the Chinese government's regulatory policies in aiding the country's transition from a command-and-control to a market economy, based on information disclosure regulations, is also examined (Fang, Liu, & Gao, 2019). The primary cause of the UK's decline in CO2 emissions is a reduction in capital spending (Karim, Albitar, & Elmarzouky, 2021). This document discusses the aspects that determine a company's performance in obtaining environmental awards. To be eligible for environmental awards, a company must have an environmental management system, connect with stakeholders, and disclose specific environmental initiatives. The data suggest that industry affiliation influences environmental information disclosure and the potential to obtain an award. To be successful, companies rely on socially desirable actions, stakeholder theory, and legitimacy theory (Hassan & Ibrahim, 2012). This research looks at different reasons why companies might disclose their environmental investments, such as whether the money spent is important. It also talks about why companies might disclose their environmental investments for policy and regulatory reasons instead of better environmental performance (Cho, Freedman, & Patten, 2012). This study examines how the financial structures of cement companies affect emissions. Sales, gross

profit margins, and current key figures have a positive impact on emissions, while earnings before interest, taxes, depreciation, and amortization, liquidity, leverage, and turnover ratios for receivables have a negative impact. The study did not find a significant connection with carbon dioxide levels but did find a correlation between emissions levels and financial indicators (Demirel & Eskin, 2017). This study looks at calculating carbon emissions disclosure for UK companies. Carbon emissions have declined, and capital expenditure has also declined over the last six years (Akram et al., 2021; Dao et al., 2022; Gao, Xiong, Luo, & Meng, 2023; Rezina et al., 2020; Wasara & Ganda, 2019). Taken together, these studies support the notion that capital requirements, size, profitability, and capital expenditures affect the quality of environmental reporting. They also emphasize the importance of good corporate governance and informative environmental information for stakeholders. Additionally, these studies consider environmental management as one of the factors influencing a company's ability to win environmental awards.

The PLS-SEM analysis was initiated by generating a path diagram as depicted in Figure 1.

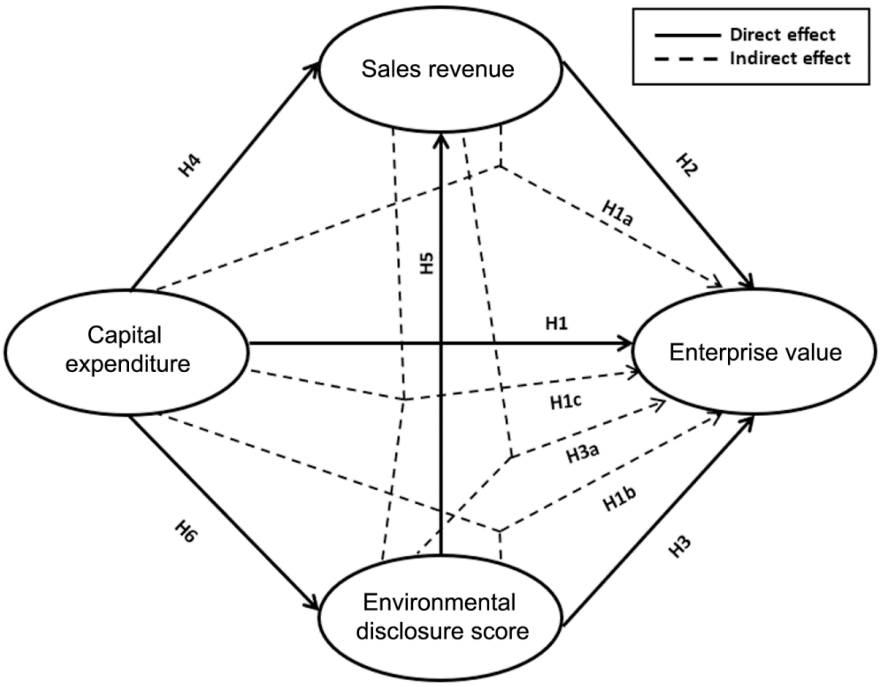

Figure 1. Structural equation model.

3. METHODOLOGY

3.1. Data Collection and Sampling

Our research is based on a meticulous dataset of fifteen leading Indian cement companies over a period of 10 years, indexed in NSE. Data from other firms is not available and is sourced entirely from secondary data accessed through the Bloomberg platform. Significant results were obtained from structural equation path modeling using the bootstrapping technique with five thousand resamples from the original sample data. An advantage of bootstrapping is that it allows the researcher to make inferences without making strong distributional assumptions, further reinforcing the reliability and validity of our results. This methodology facilitated the estimation of standard errors and confidence intervals pertaining to the coefficients of the model. This focused approach exclusively addresses the dynamic nature of the Indian market, thereby allowing for a comprehensive analysis of its distinctive drivers and challenges. We are enabled to scrutinize trends in production capacity, pricing dynamics, market share, and regulatory frameworks that are specific to the Indian context. By concentrating solely on Indian enterprises, this study seeks to furnish a detailed and contextually pertinent analysis of the cement industry within the framework of the Indian economic landscape. This deliberate data collection strategy guarantees both cost efficiency and access to

a diverse array of reliable information, thereby establishing a robust foundation for our investigation into the complexities of the Indian cement market.

3.2. Measures

To explore the intricate relationships among capital expenditure, environmental disclosure, and shareholder value in the Indian cement industry, this study employs an inner model based on Structural Equation Modeling (SEM), utilizing quantitative continuous data and analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM). The use of such econometric models, commonly referred to as structural equation models, dates back to the early stages of economic measurement and analysis. Exogenous variables capture variation stemming from outside the model, while endogenous variables reflect variation arising within the model or through interactions with other variables. This methodological approach was selected for its strength in handling non-normal data distributions, formative constructs, and mediating relationships. Sales are directly measured as "sales," environmental disclosure is represented by the term "environmental factor," and business value is indicated through "company market value and capital expenditure," both grouped under the "resource" construct. In this framework, capital expenditure functions as an exogenous variable influencing the endogenous variable, company value. We propose that sales revenue and environmental disclosure ratings serve as mediating variables, enabling capital expenditures to influence business value. The SEM-PLS approach adopted in this study offers advantages over earlier methodologies such as linear regression, multiple regression, and multivariate regression analysis (Akram et al., 2021; Dao et al., 2022; Gao et al., 2023; Rezina et al., 2020; Wasara & Ganda, 2019). This technique allows for the analysis of complex causal linkages, including mediation effects, which provide a greater understanding of the underlying mechanisms. Furthermore, PLS-SEM is resistant to problems such as multicollinearity and non-normality, which typically occur in financial and environmental datasets. Unlike prior studies that frequently used F-tests, Hausman tests, or nonparametric approaches, this research offers a different perspective by precisely modeling mediation using SEM-PLS (Fang et al., 2019; Olowookere et al., 2021; Wang et al., 2021). This method enables the intricate relationships between environmental measures, resource allocation, and financial performance within the Indian cement sector, contributing significantly to both academic research and practical industrial applications.

3.3. PLS-SEM Analysis

Our inquiry was systematically examined using Partial Least Squares Structural Equation Modeling (PLS-SEM), which was shown to be the most suitable approach for our study due to its numerous distinguishing features. PLS-SEM is particularly well-suited for analyzing complex research models and conducting causal-predictive evaluations (Hair, Hult, Ringle, Sarstedt, & Thiele, 2017; Henseler, Ringle, & Sinkovics, 2009). In this case, we used a complex research framework with four components that lead to six hypotheses. By implementing a "soft-modelling" method (Wold, 1980). Our PLS-SEM research aimed to explore the interplay of environmental and financial factors in the context of India's cement sector. PLS-SEM was the best approach for our investigation since it was appropriate for theory development and exploratory endeavors (Richter, Sinkovics, Ringle, & Schlägel, 2016).

Table 2 presents the key variables used from the study, along with corresponding factors and data sources.

Table 2. Measurement table.

Measurement	Factor	Variable	Data source
Sales	Revenue	Mediator	Bloomberg
Environmental factors	Environmental disclosure score	Mediator	Bloomberg
Firm value	Enterprise value	Endogenous	Bloomberg
Resource	Capital expenditure	Exogenous	Bloomberg

Table 3. Fit indices.

AIC	BIC	Adj. BIC	SRMR	RMSEA	RMSEA	95% CI	RMSEA P
					Lower	Upper	
8811	8846	8809	0.000	0.000	0.000	0.000	NaN
CFI	TLI	RNI	GFI	Adj. GFI	Pars. GFI		
1.000	1.000	1.000	1.000	1.000	0.000		

4. OVERALL TESTS

Table 3 displays the fit indices for a regression analysis and a classification analysis. These indices are used to evaluate how well the models fit the data. The low RMSEA, perfect CFI, TLI, and RNI values indicate a good fit. Lower values of AIC, BIC, and adjusted BIC suggest that the model fits better among competing models. An SRMR of 0.000 indicates an excellent fit; the closer to zero, the better the fit. GFI values also indicate a good fit. Overall, the fit indices suggest an exceptionally good fit for the model.

Table 4. Model fit.

Variance	Saturated model	Estimated model	Result
SRMR	0.000	0.000	Accepted
D_ULS	0.000	0.000	Accepted
d_G	0.000	0.000	Accepted
Chi-square	0.000	0.000	Accepted
NFI	1.000	1.000	Accepted

As demonstrated in Table 4, the measurements of disagreement for each of our models were lower than those of the equivalent saturated and estimated models from the reference distribution. This indicates that, at the 5% and 1% significance levels, the models were not rejected, and all were accepted. Additionally, we employed 5,000 resamples for thorough bootstrapping, resulting in an SRMR of 0.000. This value indicates that the model fits well because it is lower than the recommended cutoff of 0.080.

Table 5. Inner VIF value.

Factor	Enterprise value	Environmental disclosure score	Sales revenue
Capital expenditure	2.868	1.000	1.830
Environmental disclosure score	2.214		1.830
Sales revenue	3.273		

To confirm the SEM findings, multicollinearity was evaluated through VIF analysis. Values under 3 indicate the absence of problems, whereas values ranging from 3 to 5 suggest possible issues. Table 5 shows that no significant collinearity exists in the sample.

Table 6. R-squared value.

Endogenous	R^2	R^2 adjusted	P
Enterprise value	0.865	0.862	<0.001
Sales revenue	0.702	0.690	<0.001
Environmental disclosure score	0.458	0.450	<0.001

5. ESTIMATES

The results presented in Table 6 indicate that the endogenous latent variables, with R-squared values of 86.5% for Enterprise Value, 70.2% for Sales Revenue, and 45.8% for Environmental Disclosure Score, possess moderate to strong in-sample predictive power.

Table 7 Outlays Parameter Estimates.

Table 7. Parameter estimates.

Hypothesis	Relation	β	T	p
H1	Capital expenditure => Enterprise value	-0.232	2.648	0.002
H1a	Capital expenditure => Sales revenue => Enterprise value	-0.463	4.965	<0.001
H1b	Capital expenditure => Environmental disclosure score => Enterprise value	0.097	2.455	0.036
H1c	Capital expenditure => Environmental disclosure score => Sales revenue => Enterprise value	-0.203	3.461	0.003
H2	Sales revenue => Enterprise value	0.837	8.897	<0.001
H3	Environmental disclosure score => Enterprise value	-0.143	2.722	0.008
H3a	Environmental disclosure score => Sales revenue => Enterprise value	0.300	3.868	<0.001
H4	Capital expenditure => Sales revenue	-0.553	5.577	<0.001
H5	Environmental disclosure score => Sales revenue	0.358	4.120	<0.001
H6	Capital expenditure => Environmental disclosure score	-0.677	14.113	<0.001

The structural equation method is utilized in conjunction with non-parametric and time series analysis to achieve the analysis's results. The results show that capital expenditure and enterprise value have a negative significance (β = -0.232, t = 2.648, p = 0.002). Furthermore, there is negative significance indicated by the Capital Expenditure to Enterprise Value mediated by Sales Revenue (β = -0.463, t = 4.965, p <0.001). The Environmental Disclosure Score mediates the Capital Expenditure to Enterprise Value (β = 0.097, t = 2.455, p = 0.036), showing positive significance. Conversely, the Environmental Disclosure Score and Sales Revenue mediates the Capital Expenditure to Enterprise Value (β = -0.203, t = 3.461, p = 0.003), showing negative significance. Sales Revenue to Enterprise Value (β = 0.837, t = 8.897, p<0.001) shows a positive significance; Environmental Disclosure Score to Enterprise Value (β = -0.143, t = 2.722, p = 0.008) shows a negative significance; and Environmental Disclosure Score to Enterprise Value mediated by Sales Revenue (β = 0.300, t = 3.868, p<0.001) shows a positive significance. Capital Expenditure to Sales Revenue indicates negative significance relation (β = -0.553, t = 5.577, p<0.01), Environmental Disclosure Score to Sales Revenue indicates positive significance relation (β = 0.358, t = 4.120, p<0.01) and Capital Expenditure to Environmental Disclosure Score (β = -0.677, t = 14.113, p<0.001) indicates a negative significance relation.

Figure 2 illustrates the Hypothesis model of the study.

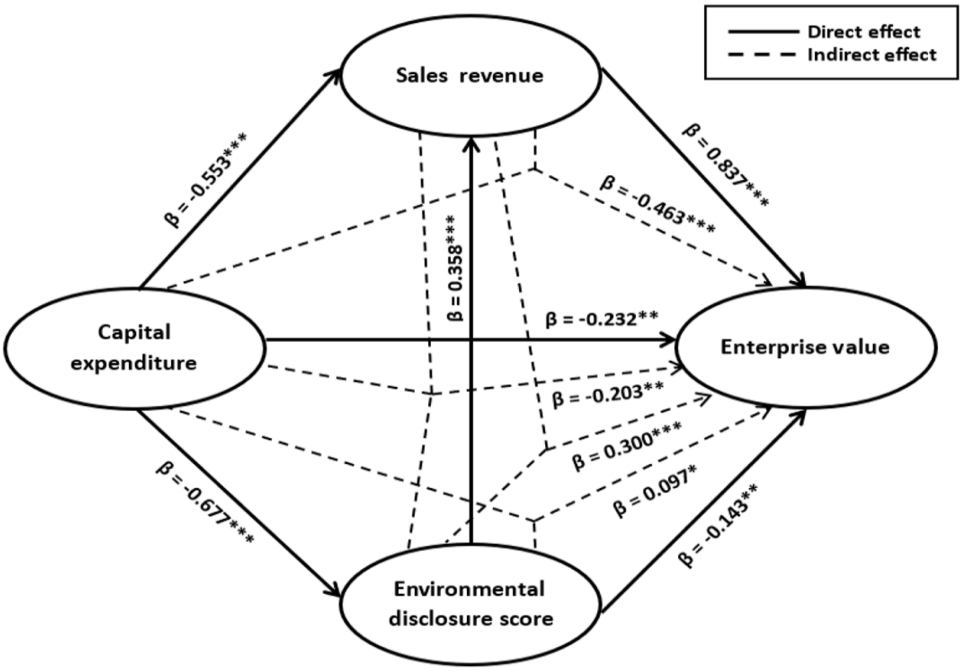

Figure 2. Hypothesis model.

Note: *p<.05, **p<.01, ***p<.001.

6. DISCUSSIONS

The study adopts a comprehensive approach by integrating analyses of ESG factors and financial factors, recognizing their combined impact on company value. The investigation of mediation mechanisms, such as the mediating roles of sales and environmental factors, adds depth to the analysis. After reviewing our study, we found that capital expenditure affects company value. This finding differs from other research, which indicated a positive effect, as lower inventory and working capital turnover ratios increase the value of the firm (Farooq & Masood, 2016; Shahzad et al., 2015). The results of our study suggest a negative correlation, as high capital expenditures are associated with higher fixed costs and greater reliance on debt financing, making the firm more vulnerable to economic and financial instability and raising questions about its long-term viability. Our study demonstrates that even though revenue mediates capital expenditures, they still impact company value. Some studies provided more mixed but positive results, suggesting that working capital management can increase profitability and that relying on retained earnings and debt should only be used as a last resort (Ogbulu et al., 2018; Shahzad et al., 2015). Our results suggest a negative correlation, indicating that concerns about efficiency, excessive leverage, and sustainability arise when revenues are stagnant while capital expenditures are high. Analysts say previous research has also produced encouraging results.

These include the potential to enhance environmental factors and lower equity capital costs after new environmental policies are implemented (Yao & Liang, 2019). According to our findings, investments aligned with sustainable practices and innovations positively impact company value because they attract investors who support sustainability and encourage them to join the company. Our research shows that capital expenditures influence company value, even when accounting for revenue and environmental factors. Other studies present contradictory results; while environmental disclosure and financial characteristics such as firm size and capital requirements are positively correlated, there is also a positive and negative correlation with the firm's cost of equity capital (Ahmadi & Bouri, 2017; Plumlee et al., 2015).

Our analysis shows that high capital expenditure has a negative impact on company value because it increases production, which in turn leads to a greater environmental impact and lower sales. Our research indicates that company value and sales revenue are positively correlated. According to other studies, the relationship between capital structure and non-tax shields affects profitability in both positive and negative ways, depending on the cost-income ratio (Akram et al., 2021; Rezina et al., 2020).

According to our findings, high sales have a positive effect on company value because more investors focus on profits and less on sustainability. Next, the results of our study complement what has already been written by showing which factors influence the cement industry's environmental disclosure and what this means for the well-being of stakeholders. A negative beta could indicate that investors perceive strong environmental reporting as a sign of lower risk, and strong environmental reporting may be a signal of regulatory compliance and a lower likelihood of future fines or penalties, thereby reducing risk and potentially increasing shareholder value. It is shown that there is a positive and significant relationship with the value of cement companies, which conveys that efficient working capital management leads to an increase in company value (Farooq & Masood, 2016). This indicates that the company's performance tends to move inversely with the overall market.

This suggests that the company is prioritizing long-term growth and expansion, even during economic downturns. Our study found a relationship between a company's value and its market value, but there is no association between environmental disclosure and its profitability. The favorable association might be the result of a broader market trend in which consumers and investors place a higher value on sustainability, raising the valuations of businesses seen as environmentally conscious. Other factors not included in the model, such as brand reputation, geographic location, or economic conditions, could influence both sales and environmental disclosure, resulting in a spurious correlation.

Finally, our study on the association between environmental disclosure scores and sales revenue has shown positive significance for the cement industry. Some studies found a negative association between company characteristics and environmental disclosure, as they had a negative association with the company's economic performance (Smith et al., 2007). Nevertheless, our research revealed a significant positive relationship between the environmental disclosure score and sales revenue.

This suggests that companies with strict environmental disclosure practices tend to be more favorable to consumers and investors. Adopting sustainable practices leads to cost savings in the long run and can contribute to higher profit margins and potentially higher revenue through these cost savings. In contrast, this study shows that the correlation between capital expenditure and environmental reporting assessment has a negative significance for the cement industry. Some studies found that higher environmental reporting quality was positively related to environmental performance and effective corporate governance and positively improved investor perceptions (Iatridis, 2013).

Our research shows a negative association between capital expenditures and environmental disclosure scores, as it suggests that if a company does not adhere to environmental practices and maintains high capital expenditures, it will negatively impact the environment, thereby driving investors away from the company where expenditures are made, which could be severely affected. The research aims to bridge the gap between academic inquiry and practical decision-making. By providing insights into the factors influencing company value, the study has the potential to offer actionable recommendations for industry practitioners, policymakers, and investors.

Table 8 presents a synopsis supporting the study's hypothesis.

Table 8. Synopsis of supporting the study's hypothesis.

Hypothesis	Description	Decision
H1	Capital expenditure has a negative association with the enterprise value of the Indian cement sector.	Supported
H1a	Capital spending has a negative influence on enterprise value, but sales revenue acts as a mediator.	Supported
H1b	There is a positive association between capital spending and enterprise value, with environmental disclosure serving as a mediator.	Supported
H1c	Capital expenditure and enterprise value have a negative connection, with sales income serving as a mediator between the two.	Supported
H2	Sales revenue has a favorable impact on enterprise value.	Supported
H3	There is a favorable correlation between environmental disclosure scores and enterprise value.	Supported
H3a	Sales income, as the mediator between environmental disclosure score and enterprise value, has a favorable influence on the Indian cement sector.	Supported
H4	There is a negative correlation between capital expenditure and sales income in the Indian cement sector.	Supported
H5	The environmental disclosure score and sales income have a detrimental influence on the Indian cement sector.	Supported
H6	Capital spending has a negative influence on the environmental disclosure score of the Indian cement sector.	Supported

7. IMPLICATIONS

The study emphasizes the significance of environmental disclosure scores, capital expenditure, sales revenue, enterprise value, and other variables such as greenhouse gases, carbon dioxide, energy use, alternative fuel use percentage, waste, water, and other environmental factors in the cement industry. It is shown that there is a positive and significant relationship with the value of cement companies, which indicates that efficient working capital management leads to an increase in company value (Farooq & Masood, 2016). The hypothesis H1b suggests that there is a positive relationship between capital expenditure and enterprise value, with the environmental disclosure score acting as a mediator. To analyze the interaction between capital expenditure and sales concerning company

value, a dynamic analysis has been recently introduced. This analysis indicates that even if a company has increased capital and sales, stakeholders may still prefer the company to be environmentally friendly, without negatively impacting society. The findings of this research have several implications for the Indian cement industry.

The hypothesis H1 is corroborative and posits that enterprises ought to exercise caution in undertaking substantial capital expenditures, while concurrently advocating for a concentrated effort on alternative methodologies to augment stakeholder value, such as through cost minimization or enhancements in operational efficiency. The hypothesis H1a is corroborative and advocates for firms to exercise prudence with respect to substantial capital expenditures.

Should such capital expenditures fail to engender an increase in sales revenue, there exists the potential for a detrimental effect on the enterprise's economic value. The hypothesis H1c articulates that in scenarios where a negative correlation exists between capital expenditure and enterprise value, sales revenue serves as a mediating variable between the two, notwithstanding the support for the decision at hand. H2 is supportive as there is a positive relationship between sales revenue and enterprise value. H3 signifies a positive impact between the environmental disclosure score and the enterprise value. H3a supports a positive relationship where sales revenue is the mediator between environmental disclosure score and enterprise value in the cement industry. In the H4 hypothesis, there is a negative impact connecting capital expenditure and sales revenue in the Indian cement industry. H5 shows a negative impact on the cement industry, where environmental disclosure score and sales revenue are the variables. H6 suggests that there is a negative impact of capital expenditure and environmental disclosure scores on the Indian cement industry.

8. CONCLUSION

The current study aimed to determine the significance and impact of capital expenditure, sales revenue, enterprise value, and environmental disclosure scores in the cement industry. The study demonstrates that sales and enterprise value are strongly correlated, as profitability is a key factor at that time. However, when capital expenditure is considered, enterprise value decreases again, since the company may be unable to generate as much revenue without also adopting sustainable practices. Nevertheless, enterprise value can be enhanced if environmental considerations are incorporated into capital expenditure to benefit the environment, given that investors today place greater emphasis on sustainability than on profit. When environmental and sales factors are mediated through capital expenditure, the enterprise value decreases because most profits are allocated to capital expenditure and less toward sustainability. This, in turn, reduces the enterprise value. The study shows that capital expenditure has a detrimental effect on both sales and environmental disclosure, as increased capital expenditure significantly impacts the environment, which subsequently reduces sales since investors prioritize sustainability over profit. Investors seek companies that support the environment and produce products with minimal environmental impact while meeting their needs.

Environmental disclosure has a direct negative impact on enterprise value because few sustainable measures are implemented; this ultimately diminishes the enterprise's value. However, environmental disclosure combined with sales has a positive effect on enterprise value, as it aligns with investors' desire to support the environment while companies focus on sustainable business practices. Consequently, this satisfies investors' environmental concerns, boosts sales, and ultimately increases the firm's value. The study highlights that capital expenditure negatively affects the environment, sales, and enterprise value unless sustainable practices are integrated. Additionally, environmental disclosure positively impacts enterprise value when paired with sales, demonstrating a concern for sustainability and profitability.

Overall, the study emphasizes that environmental factors are powerful drivers that support evidence for improved sales and enhanced enterprise value compared to capital expenditure within the cement industry.

9. LIMITATIONS AND FUTURE RESEARCH

This investigation possesses certain constraints that warrant recognition. The sample is confined to Indian cement enterprises, thereby constraining the global applicability of the findings. A concentrated emphasis on specific metrics, such as the proportion of alternative fuel utilized, waste generation, water consumption, carbon dioxide emissions, energy usage, greenhouse gas emissions, and waste management, may obscure other significant variables that influence the complex interplay between financial performance and the dimensions of environmental, social, and governance factors. The research may not sufficiently encapsulate the evolving industrial and economic dynamics over time, owing to its reliance on a designated temporal trend. A more comprehensive understanding of the environmental, social, and governance landscape within the cement sector could be attained through subsequent investigations that encompass a broader array of variables, an extended data timeframe, and supplementary qualitative elements. These constraints underscore the necessity for prudence when generalizing the study's outcomes beyond the Indian context and highlight avenues for more thorough and meticulous research in the future.

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REFERENCES

Aerts, W., Cormier, D., & Magnan, M. (2008). Corporate environmental disclosure, financial markets and the media: An international perspective. *Ecological Economics*, *64*(3), 643-659. https://doi.org/10.1016/j.ecolecon.2007.04.012

Ahmad, T. (2014). Impact of capital structure on profitability: an empirical analysis of cement sector of Pakistan. *Research Journal of Finance and Accounting*, *5*(17), 49-54.

Ahmadi, A., & Bouri, A. (2017). The relationship between financial attributes, environmental performance and environmental disclosure: Empirical investigation on French firms listed on CAC 40. *Management of Environmental Quality: An International Journal*, *28*(4), 490-506. https://doi.org/10.1108/MEQ-07-2015-0132

Akram, T., Farooq, M. U., Akram, H., Ahad, A., & Numan, M. (2021). The impact of firm size on profitability – A study on the top 10 cement companies of Pakistan. *Jurnal Aplikasi Manajemen, Ekonomi Dan Bisnis*, *6*(1), 14-24. https://doi.org/10.51263/jameb.v6i1.137

Anyakwu, M. A. (2022). The effect of capital structure on the profitability of cement industry in Nigeria. *Journal of Economics, Finance and Management Studies*, *5*(04 April 2022), 997-1012. https://doi.org/10.47191/jefms/v5-i4-10

Asuquo, A. I., Dan, N. O., & Effiong, G. T. (2020). Effect of eco-friendly costs on net revenue of cement producing firms. *International Journal of Scientific and Technology Research*, *9*(9), 235-240.

Barbudo, M. Á. S. (2016). The cement industry's commitment to reduce CO 2 emissions in the context of the COP 21 (Paris 2015). *Materiales de Construcción*, *66*(321), ed007-ed007.

Barcelo, L., Kline, J., Walenta, G., & Gartner, E. (2014). Cement and carbon emissions. *Materials and Structures*, *47*(6), 1055-1065.

Beretta, V., Demartini, C., & Trucco, S. (2018). Does environmental, social and governance performance influence intellectual capital disclosure tone in integrated reporting? *Journal of Intellectual Capital*, *20*(1), 100-124. https://doi.org/10.1108/JIC-02-2018-0049

Cho, C. H., Freedman, M., & Patten, D. M. (2012). Corporate disclosure of environmental capital expenditures: A test of alternative theories. *Accounting, Auditing & Accountability Journal*, *25*(3), 486-507.

Clarkson, P. M., Fang, X., Li, Y., & Richardson, G. (2013). The relevance of environmental disclosures: Are such disclosures incrementally informative? *Journal of Accounting and Public Policy*, *32*(5), 410-431.

Conlin, M., & Thompson, P. N. (2017). Impacts of new school facility construction: An analysis of a state-financed capital subsidy program in Ohio. *Economics of Education Review, 59*, 13-28.

Cormier, D., & Magnan, M. (2015). The economic relevance of environmental disclosure and its impact on corporate legitimacy: An empirical investigation. *Business Strategy and the Environment, 24*(6), 431-450.

Dao, H. A., Tra, P. T., & Nguyen, T. T. (2022). Factors affecting the profitability of cement manufacturing enterprises in Tuyen Quang province. *Macro Management & Public Policies, 4*(2), 20–28.

Demirel, E., & Eskin, İ. (2017). Relation between environmental impact and financial structure of cement industry. *International Journal of Energy Economics and Policy, 7*(1), 129-134.

Deswanto, R. B., & Siregar, S. V. (2018). The associations between environmental disclosures with financial performance, environmental performance, and firm value. *Social Responsibility Journal, 14*(1), 180-193. https://doi.org/10.1108/srj-01-2017-0005

Díaz, Y. C., Berriel, S. S., Heierli, U., Favier, A. R., Machado, I. R. S., Scrivener, K. L., . . . Habert, G. (2017). Limestone calcined clay cement as a low-carbon solution to meet expanding cement demand in emerging economies. *Development Engineering, 2*, 82-91.

Fama, E. F., & Gibbons, M. R. (1982). Inflation, real returns and capital investment. *Journal of Monetary Economics, 9*(3), 297-323. https://doi.org/10.1016/0304-3932(82)90021-6

Fang, J., Liu, C., & Gao, C. (2019). The impact of environmental regulation on firm exports: Evidence from environmental information disclosure policy in China. *Environmental Science and Pollution Research, 26*(36), 37101-37113. https://doi.org/10.1007/s11356-019-06807-2

Farooq, M. A., & Masood, A. (2016). Impact of financial leverage on value of firms: Evidence from cement sector of Pakistan. *Research Journal of Finance and Accounting, 7*(9), 73-77.

Fazzini, M., & Dal Maso, L. (2016). The value relevance of "assured" environmental disclosure: The Italian experience. *Sustainability Accounting, Management and Policy Journal, 7*(2), 225-245.

Gao, A., Xiong, T., Luo, Y., & Meng, D. (2023). Promote or crowd out? The impact of environmental information disclosure methods on enterprise value. *Sustainability, 15*(4), 3090.

Gordon, L. A., & Iyengar, R. J. (1996). Return on investment and corporate capital expenditures: empirical evidence. *Journal of Accounting and Public Policy, 15*(4), 305-325.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., & Thiele, K. O. (2017). Mirror, mirror on the wall: A comparative evaluation of composite-based structural equation modeling methods. *Journal of the Academy of Marketing Science, 45*, 616-632. https://doi.org/10.1007/s11747-017-0517-x

Hassan, A., & Ibrahim, E. (2012). Corporate environmental information disclosure: Factors influencing companies' success in attaining environmental awards. *Corporate Social Responsibility and Environmental Management, 19*(1), 32-46.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In *New challenges to international marketing* (Vol. 20, pp. 277-319): Emerald Group Publishing Limited. https://doi.org/10.1108/s1474-7979(2009)0000020014.

Hijazi, S. T., & Tariq, Y. B. (2006). Determinants of capital structure: A case for the Pakistani cement industry. *The Lahore Journal of Economics, 11*(1), 63-80. https://doi.org/10.35536/LJE.2006.V11.I1.A4

Hoque, A., Mia, A., & Anwar, R. (2015). Working capital management and profitability: A study on cement industry in Bangladesh. *Research Journal of Finance and Accounting, 6*(7), 18-28.

Iatridis, G. E. (2013). Environmental disclosure quality: Evidence on environmental performance, corporate governance and value relevance. *Emerging Markets Review, 14*, 55-75. https://doi.org/10.1016/j.ememar.2012.11.003

Iranmahd, M., Moeinaddin, M., Shahmoradi, N., & Heyrani, F. (2014). The effect of intellectual capital on cost of finance and firm value. *International Journal of Academic Research in Accounting, Finance and Management Sciences, 4*(2), 1-8.

Jeyachitra, A., Bennet, E., Nageswari, P., & Parasuraman, S. (2010). Receivable management of Indian cement industry in a changed scenario. *SMART Journal of Business Management Studies, 6*(1), 78-87.

Jiang, Y., Guo, C., & Wu, Y. (2021). Can environmental information disclosure promote the high-quality development of enterprises? The mediating effect of intellectual capital. *Environmental Science and Pollution Research*, *28*, 30743-30757. https://doi.org/10.1007/s11356-021-12921-x

Karim, A. E., Albitar, K., & Elmarzouky, M. (2021). A novel measure of corporate carbon emission disclosure, the effect of capital expenditures and corporate governance. *Journal of Environmental Management*, *290*, 112581.

Kazancoglu, Y., Kazancoglu, I., & Sagnak, M. (2018). Fuzzy DEMATEL-based green supply chain management performance: Application in cement industry. *Industrial Management & Data Systems*, *118*(2), 412-431.

Khaksar, E., Abbasnejad, T., Esmaeili, A., & Tamošaitienė, J. (2016). The effect of green supply chain management practices on environmental performance and competitive advantage: A case study of the cement industry. *Technological and Economic Development of Economy*, *22*(2), 293-308. https://doi.org/10.3846/20294913.2015.1065521

Khaksarian, F. (2014). A study on the effect of working capital management on profitability on Cement and Petrochemical industries: Evidence from Tehran stock exchange. *Management Science Letters*, *4*(7), 1571-1576.

Kumar, P. K., John, S. F., & Senith, S. (2013). A study on factors affecting performance of Indian cement industry. *European Journal of Business and Management*, *5*(29), 191-199.

Liu, X., & Fan, Y. (2018). Business perspective to the national greenhouse gases emissions trading scheme: A survey of cement companies in China. *Energy Policy*, *112*, 141-151. https://doi.org/10.1016/j.enpol.2017.10.019

Nawaz, R., Hussain, I., Noor, S., Habib, T., & Omair, M. (2020). The significant impact of the economic sustainability on the cement industry by the assessment of the key performance indicators using Taguchi signal to noise ratio. *Cogent Engineering*, *7*(1), 1810383.

Nguyen, Q. A., & Hens, L. (2015). Environmental performance of the cement industry in Vietnam: The influence of ISO 14001 certification. *Journal of Cleaner Production*, *96*, 362-378. https://doi.org/10.1016/j.jclepro.2013.09.032

Nitzan, J. (1998). Differential accumulation: towards a new political economy of capital. *Review of International Political Economy*, *5*(2), 169-216.

Nollet, J., Filis, G., & Mitrokostas, E. (2016). Corporate social responsibility and financial performance: A non-linear and disaggregated approach. *Economic Modelling*, *52*, 400-407. https://doi.org/10.1016/j.econmod.2015.09.019

Ogbulu, M., Okanta, S. U., & Turakpe, M. J. (2018). Capital structure and corporate financial performance: evidence from Nigerian cement companies. *Archives of Business Research*, *6*(3), 222-244. https://doi.org/10.14738/abr.63.4275

Olowookere, J. K., Taiwo, A., & Onifade, A. (2021). Environmental accounting disclosure practices and financial performance of listed cement companies in Nigeria. *Gusau Journal of Accounting and Finance*, *2*(2), 1-12.

Plumlee, M., Brown, D., Hayes, R. M., & Marshall, R. S. (2015). Voluntary environmental disclosure quality and firm value: Further evidence. *Journal of Accounting and Public Policy*, *34*(4), 336-361. https://doi.org/10.1016/j.jaccpubpol.2015.04.004

Prabhakar, B., & Japee, G. (2023). An analytical study of Ambuja cements ltd. and ACC ltd. based on various profitability measurements. *International Journal of Management, Public Policy and Research*, *2*(1), 136–142.

Qiu, Y., Shaukat, A., & Tharyan, R. (2016). Environmental and social disclosures: Link with corporate financial performance. *The British Accounting Review*, *48*(1), 102-116.

Rezina, S., Ashraf, A., & Khan, M. A. (2020). An inferential study on the profitability determinants of the cement industry in Bangladesh. *Asian Finance & Banking Review*, *4*(2), 8-21.

Richter, N. F., Sinkovics, R. R., Ringle, C. M., & Schlägel, C. (2016). A critical look at the use of SEM in international business research. *International Marketing Review*, *33*(3), 376-404. https://doi.org/10.1108/imr-04-2014-0148

Shahzad, F., Fareed, Z., & Zulfiqar, B. (2015). Impact of working capital management on firm's profitability: A case study of cement industry of Pakistan. *European Researcher*, (2), 86-93.

Shen, W., Liu, Y., Yan, B., Wang, J., He, P., Zhou, C., . . . Ding, Q. (2017). Cement industry of China: Driving force, environment impact and sustainable development. *Renewable and Sustainable Energy Reviews*, *75*, 618-628.

Smith, M., Yahya, K., & Marzuki Amiruddin, A. (2007). Environmental disclosure and performance reporting in Malaysia. *Asian Review of Accounting*, *15*(2), 185-199.

Sterlacchini, A. (1998). Inputs and outputs of innovative activities in Italian manufacturing. *Economics of Innovation and New Technology*, *7*(4), 323-344. https://doi.org/10.1080/10438599800000039

Szabó, L., Hidalgo, I., Ciscar, J. C., & Soria, A. (2006). CO2 emission trading within the European Union and Annex B countries: the cement industry case. *Energy Policy*, *34*(1), 72-87.

Tu, H., Dai, W., & Xiao, X. (2022). Study on the environmental efficiency of the Chinese cement industry based on the undesirable output DEA model. *Energies*, *15*(9), 3396. https://doi.org/10.3390/en15093396

Turner, M. J., & Hesford, J. W. (2019). The impact of renovation capital expenditure on hotel property performance. *Cornell Hospitality Quarterly*, *60*(1), 25-39. https://doi.org/10.1177/1938965518779538

Ullah, F. (2019). Firm profitability and the administration of working capital: Delving into a case of the cement sector of Pakistan. *Journal of Business & Tourism*, *5*(2), 59-64.

Ullah, M., Afgan, N., & Afridi, S. A. (2019). Effects of corporate governance on capital structure and financial performance: Empirical evidence from listed cement corporations in Pakistan. *Global Social Sciences Review*, *4*(3), 273-283.

Wang, Q., Xu, X., & Liang, K. (2021). The impact of environmental regulation on firm performance: Evidence from the Chinese cement industry. *Journal of Environmental Management*, *299*, 113596. https://doi.org/10.1016/j.jenvman.2021.113596

Wasara, T. M., & Ganda, F. (2019). The relationship between corporate sustainability disclosure and firm financial performance in Johannesburg Stock Exchange (JSE) listed mining companies. *Sustainability*, *11*(16), 4496. https://doi.org/10.3390/su11164496

Wold, H. (1980). Model construction and evaluation when theoretical knowledge is scarce: Theory and application of partial least squares. In *Evaluation of econometric models* (pp. 47-74). New York: Elsevier.

Yao, S., & Liang, H. (2019). Analyst following, environmental disclosure and cost of equity: Research based on industry classification. *Sustainability*, *11*(2), 300. https://doi.org/10.3390/su11020300