

## CORPORATE SUSTAINABILITY REPORTING AND INVESTOR SENTIMENT: A SUSTAINABLE DEVELOPMENT PROSPECTIVE ON PAKISTAN-LISTED COMPANIES

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### Abstract

*This study uses the Pakistan Stock Exchange (PSX) as an example to explore the relationship between environmental, social, and governance (ESG) information disclosure and investor sentiment. ESG disclosure data was obtained from the ESG Sustain platform of the Securities and Exchange Commission of Pakistan (SECP), and an ESG index based on information disclosure was constructed using environmental, social, and governance indicators. Investor sentiment is measured through market-based indicators, particularly stock trading volume and trading activity, which reflect investors' behavioral responses to ESG-related disclosures. Additionally, company-level control variables, including company size, profitability, leverage ratio, and growth rate, are incorporated. A panel data regression framework is used to assess the impact of ESG information disclosure on investor sentiment. The baseline estimates were performed using a fixed-effects panel regression model to control for unobserved company-specific heterogeneity. Empirical results show a significant correlation between higher ESG disclosure scores and positive investor sentiment. Further analysis shows that the positive impact of environmental and governance information disclosure on investor sentiment is significantly stronger than that of social information disclosure, as evidenced by higher and more statistically significant coefficients estimates. Robustness tests and alternative model specifications both confirm these findings. This study contributes to the literature by providing empirical evidence from emerging markets where ESG reporting is still developing. The findings highlight the importance of transparent sustainability reporting for enhancing investor confidence and supporting the development of Pakistan's capital markets.*

**Keywords:** Sustainability reporting, investor sentiment, Pakistan Stock Exchange, ESG disclosures

### INTRODUCTION

In recent years, sustainability and corporate social responsibility have become key components of global corporate strategy and investor decision-making. Environmental, Social, and Governance (ESG) principles have become a crucial framework for assessing how companies manage their environmental impact, social responsibility, and governance practices (Marc et al., 2022; Khalid et al., 2025; Siddique et al., 2025; Mehdi et al., 2025; Abbasi et al., 2025; Arshad et al., 2025; Ammar et al., 2025; Amir et al., 2025; Iqbal et al., 2025; Farras et al., 2025). ESG disclosure provides stakeholders with information on a company's sustainability performance, risk management practices, and long-term value creation. In emerging markets, as corporate governance and transparency standards are still evolving, ESG reporting is gaining increasing attention as a tool for enhancing accountability and attracting investment. Pakistan, as an emerging market, is increasingly focused on sustainability. While past research on Pakistani listed companies has explored the relationship between ESG practices and company-level financial or accounting metrics such as profitability, firm value, and risk, research on the behavioral impact of ESG disclosure remains limited. Of particular note is the scarcity of research on how ESG disclosure affects investor sentiment, which reflects market participants' perceptions and reactions beyond traditional financial fundamentals. This difference is important because investor sentiment reflects short- to medium-term market behavior and information responses, which accounting-based metrics may not fully explain, especially in emerging markets with high levels of uncertainty and information asymmetry.

The Securities and Exchange Commission of Pakistan (SECP) has launched an ESG Sustain platform to encourage companies to report their sustainability practices and improve the transparency of listed companies. However, despite these regulatory initiatives, ESG reporting remains voluntary for many companies, and the level of disclosure varies significantly across different industries (Marc & Ali, 2023; Bukhari et al., 2025; Arshi et al., 2025; Batool et al., 2025; Zahid et al., 2025). Therefore, investors often face information asymmetry when assessing the sustainability performance of Pakistani companies. This study aims to investigate how ESG information disclosure affects investor sentiment at the Pakistan Stock Exchange (PSX), where market behavior is influenced by both financial performance and non-financial information. Investor sentiment refers to the overall attitude of investors towards a particular market or company, and this attitude cannot always be fully explained by fundamental financial factors. In emerging markets, investor sentiment is influenced by market volatility, macroeconomic conditions, and the availability of reliable company

information (Marc & Ali, 2023; Zahid et al., 2025; Rafique et al., 2025; Umair et al., 2025; Ali et al., 2025; Shaukat et al., 2025; Aman et al., 2025).

Sustainability disclosure can play a key role in shaping investor sentiment by increasing transparency, reducing uncertainty, and signaling the company's long-term strategic direction (Marc et al., 2023; Naeem et al., 2025; Ali et al., 2025; Ditta et al., 2025; Iqbal et al., 2025; Ali et al., 2025; Zafar et al., 2025; Ullah et al., 2025; Ali et al., 2025; Karim et al., 2025; Ali et al., 2025; Khalid et al., 2025; Ali et al., 2025). Therefore, it is necessary to examine whether ESG information disclosure helps improve investors' positive perception of the Pakistani market and whether it affects market behavior. This study contributes to the existing literature by extending ESG research in emerging markets from accounting-based performance results to investor behavior, and provides empirical evidence on how sustainability information disclosure influences investor sentiment in developing capital markets. This study utilizes data from the ESG Sustain platform of the Securities and Exchange Commission of Pakistan (SECP) to construct an ESG index based on information disclosure and employs panel data regression techniques to analyze the relationship between this index and investor sentiment. The findings are expected to provide policymakers, regulators, and corporate managers with insights into the role of sustainability reporting in enhancing market transparency and investor confidence. Through analyzing ESG information disclosure in Pakistan, This research also helps to understand how non-financial information influences investor behavior in developing economies.

#### **LITERATURE REVIEW**

#### **CORPORATE SUSTAINABILITY REPORTING IS WIDELY RECOGNIZED FOR ENHANCING TRANSPARENCY AND STAKEHOLDER ENGAGEMENT**

#### **SUSTAINABILITY REPORTING AND FINANCIAL PERFORMANCE**

To integrate previous research, this paper divides the literature into three thematic sections. The first section examines the relationship between sustainability reporting and firm-level financial and market performance. The second section uses behavioral finance and signaling theory to focus on the relationship between sustainability information disclosure and investor sentiment. The third section reviews research on regulatory intervention and mandatory disclosure systems, focusing on the impact of these systems on information asymmetry and market efficiency. This structure makes this study stand out more clearly in the existing literature and highlights its contribution to investor sentiment analysis in the context of emerging markets.

#### **SUSTAINABILITY DISCLOSURE AND INVESTOR SENTIMENT**

Based on behavioral finance theory, a growing body of literature explores how perpetual information disclosure influences investor sentiment and market behavior, going beyond traditional financial fundamentals. Investor sentiment reflects behavioral biases, beliefs, and psychological reactions that cannot be fully explained by rational asset pricing models. This is particularly important in emerging markets, which often exhibit higher uncertainty and information asymmetry (Baker and Wurgler, 2006; De Long et al., 1990). (Marc et al., 2023; Ali et al., 2025; Ali et al., 2025; Azizi et al., 2025). Essam et al. (2025) analyzed investor sentiment and trust in sustainability reporting in Egypt from 2015 to 2023. With growing recognition of behavioral dynamics in financial decision-making, recent studies explore how corporate sustainability performance affects investor psychology and managerial behavior. Shen et al. (2022) investigated the relationship between corporate sustainability performance, investor sentiment, and managerial overconfidence using Chinese listed firms from 2010 to 2018. As timely and effective Environmental, Social, and Governance communication gains importance in capital markets, research increasingly evaluates how sustainability messages released through media channels influence investor responses and firm valuation. Jeong et al. (2025) assessed investor sentiment toward Environmental, Social, and Governance news using sustainability reports and media coverage. Given the expanding role of information-based signals in financial markets, further studies analyze how Environmental, Social, and Governance news sentiment affects stock return dynamics in emerging economies (Audi et al., 2021; Nyakurukwa & Seetharam, 2023; Ali et al., 2025; Ali et al., 2025).

Corporate sustainability reporting has been extensively studied, with particular attention paid to its relationship with corporate financial performance, transparency, and stakeholder engagement, especially through assessments using accounting and market-based outcome metrics. Early fundamental research provides strong evidence that sustainability-oriented strategies are closely associated with better long-term financial performance, improved risk management, and higher corporate value, especially when supported by robust governance structures (Aggarwal, 2013; Eccles et al., 2014; Porter and Kramer, 2011). Research evaluates how publicly traded firms publish corporate social responsibility reports encompassing environmental, human rights, labor, product responsibility, and social dimensions. Using the Sustainability Performance Appraisal framework, prior work assesses report comprehensiveness, stakeholder understanding, and practical applicability (Paun, 2018; Audi & Al Masri, 2024; Ali et al., 2025; Ali et al., 2025; Kanwal et al., 2025; Ahmad

et al., 2025; Saim et al., 2025; Ali et al., 2025). By integrating Environmental, Social, and Governance indicators into financial analysis, sustainability reporting influences investor behavior and firm value. Empirical studies applying quantitative econometric techniques demonstrate that Environmental, Social, and Governance disclosure significantly shapes investment decisions. Evidence suggests that comprehensive reporting strengthens investor confidence and supports sustainable investment strategies. Recommendations often include enhancing disclosure standards, adopting structured reporting frameworks, and encouraging cross-border and industry-level analyses (Marc, 2024; Amin, 2025; Longston et al., 2025; Ali et al., 2025; Rana et al., 2025; Hashmi et al., 2025; Ali et al., 2025).

Further research investigates how investor sentiment affects analyst optimism bias, particularly among European firms providing high-quality non-financial disclosures. Findings indicate that such transparency reduces sentiment-driven distortions in stock recommendations. During periods of elevated market sentiment, buy recommendations for high-persistence stocks become less informative, whereas sell recommendations for low-persistence stocks retain informational value (del Río et al., 2024; Marc & Yu, 2024). Additional evidence from analysis of more than 17,000 United States 10-K filings between 2013 and 2019 highlights the market relevance of Environmental, Social, and Governance disclosures. Using textual analysis methodologies such as Jegadeesh and Wu (2013) and the Environmental, Social, and Governance dictionary developed by Baier, Berninger, and Kiesel (2020), studies identify significant associations between Environmental, Social, and Governance tone and stock returns around filing dates. Social and governance themes trigger stronger market reactions than environmental narratives. Positive expressions such as “community” and “health” are associated with favorable returns, whereas terms such as “discrimination” and “crime” generate negative responses. Robustness tests confirm the informational significance of Environmental, Social, and Governance disclosures for investor decision-making (Audi & Ali, 2018; Ignatov and Konstantin, 2023; Ali et al., 2025; Abdullah et al., 2025; Kumar et al., 2025; Ali et al., 2025).

Recent research in behavioral finance introduces the "warm light theory," suggesting that investors exhibit preferences for socially responsible investments and are willing to pay premiums for responsible assets. However, recent macroeconomic disruptions, including the COVID-19 pandemic, supply chain instability, and inflationary pressures, have revived interest in assets previously viewed as non-responsible, indicating shifts in investor sentiment. Evidence suggests that uncertainty weakens the preference for socially responsible investments, moderating the warm light effect (Marc, 2016; Dreyer et al., 2024; Ali et al., 2025; Ashraf et al., 2025; Khan et al., 2025). Behavioral dynamics remain central, as sentiment and psychology can amplify market volatility independent of economic fundamentals. Empirical findings show that Environmental, Social, and Governance performance significantly influences sustainability reporting and investor sentiment, although mediating effects may vary across models (Elisa Navarra, 2024). Studies constructing investor sentiment indices demonstrate interactions between sentiment and Environmental, Social, and Governance returns and volatility in sustainable markets (Siregar et al., 2024). Additional panel evidence from North African markets indicates that environmental performance affects investor sentiment stability (Omar, 2024). Research further confirms that sustainability disclosures influence stock price movements, reflecting investor reactions to broader sustainability information (Li, 2025; Audi et al., 2021; Pulungan & Khomsiyah, 2024; Aqeel et al., 2025; Arshad et al., 2025; Khan et al., 2025; Shahid et al., 2025; Shahi et al., 2025; Humza et al., 2025; Sattar et al., 2025; Kanwal et al., 2025; Ahmad et al., 2025; Sabir et al., 2025). While previous research has confirmed the impact of sustainability information disclosure on stock returns and company valuations, empirical studies specifically addressing investor sentiment (as a behavioral outcome) remain limited, particularly in emerging markets like Pakistan. Existing research in Pakistan largely focuses on accounting performance or company value, with relatively little attention paid to investor sentiment.

### **REGULATORY SUSTAINABILITY DISCLOSURE AND INSTITUTIONAL EFFECTS**

Regulatory intervention in sustainable development disclosure has also attracted scholarly attention. Using a quasi-natural experiment design, research examining mandatory corporate social responsibility disclosure in the Chinese market applies a difference-in-differences approach to evaluate stock price synchronicity. Findings suggest that mandatory disclosure increases synchronicity, signaling reduced firm-specific information and altered investor information processing, while serving as a public signal (Wu, 2025; Niaz et al., 2025; Khan et al., 2025; Ghauri et al., 2025; Qaisrani et al., 2025; Ali et al., 2025; Ahmad et al., 2025). These results highlight the need to enhance disclosure quality and enforcement mechanisms. The disclosure of supervisory information is not only a compliance mechanism, but also an institutional signal that shapes investor expectations, information processing, and market efficiency, especially in jurisdictions where governance frameworks are still developing.

The dynamic interaction between investor sentiment and Environmental, Social, and Governance stock performance is particularly relevant in emerging markets. Evidence from India shows asymmetric relationships, where higher Environmental, Social, and Governance levels dampen investor sentiment, while sentiment does not significantly drive Environmental, Social, and Governance performance (Dhasmana et al., 2023; Khalil et al., 2025; Nasir et al., 2025; Anus et al., 2025). These findings underscore the complexity of behavioral influences in sustainable finance and suggest policy measures to integrate Environmental, Social, and Governance frameworks within capital markets.

Corporate governance quality remains central to sustainability reporting credibility and investment attractiveness. A comprehensive review of emerging markets demonstrates that stronger governance structures enhance reporting transparency and investor confidence (Nurastuti et al., 2025). Governance mechanisms such as board structure, ownership concentration, and oversight systems significantly reduce agency conflicts and information asymmetry, thereby increasing shareholder value and market credibility (Alnaser et al., 2014). Complementary evidence from developed markets shows that firms with strong corporate social responsibility and governance performance command positive valuation premiums, particularly during periods of low investor sentiment, due to intangible assets and reputational advantages (Azevedo et al., 2021). Corporate sustainability reporting remains central to understanding Environmental, Social, and Governance integration. A qualitative interview study of 35 Canadian firms between 2010 and 2013 examined stakeholder engagement, report integration, and data management practices. The findings showed that fully integrated reports were rare, with most firms providing partial sustainability disclosures. Key challenges included data collection, content prioritization, and balancing reporting objectives. The authors recommended deeper stakeholder engagement, use of reports for internal performance monitoring, and improved timeliness of reporting (Searcy and Buslovich, 2014).

Research on mandatory sustainability disclosure emphasizes its influence on corporate accountability. A cross-country analysis covering 58 nations employed a difference-in-differences framework to evaluate national and firm-level outcomes. Variables such as governance quality, management credibility, employee development, and environmental investment were assessed. Results indicate that mandatory reporting reduces corruption, strengthens governance mechanisms, and encourages social and environmental investments, particularly in jurisdictions with strong enforcement systems (Ioannou and Serafeim, 2011). Empirical evidence from Romanian firms highlights the connection between sustainability reporting and financial performance. By examining accessibility and practical application of sustainability tools, the study finds that integrating sustainability indicators enhances organizational outcomes and stakeholder value. Policy implications include promoting accessible reporting frameworks and encouraging assessment of long-term financial and social impacts across sectors (Oncioiu et al., 2020).

Digital transformation has further reshaped sustainability reporting. A qualitative review focusing on international corporations in the early 2020s analyzed the adoption of big data analytics, blockchain, and artificial intelligence in reporting processes. Findings suggest that digital tools improve data accuracy and transparency but require coordinated strategy and resource allocation. The study recommends strengthening digital capabilities to align technological innovation with sustainability objectives (Molho et al., 2025).

Regulatory reforms such as the European Union Corporate Sustainability Reporting Directive have also drawn scholarly attention. Evidence from Bosnia and Herzegovina, based on survey responses from accounting and finance professionals, shows that compliance enhances reporting quality and business performance. However, firms face adaptation challenges, highlighting the need to integrate sustainability into financial reporting systems and stakeholder communication strategies (Serdar Rakovic, 2024). Complementary research on European markets demonstrates that regulatory implementation may temporarily affect market value, as firms adjust to new reporting requirements (Boungou and Dufau, 2025).

Earlier empirical studies from Slovenia and India also document positive associations between sustainability reporting and firm performance. Regression analyses indicate that firms investing in sustainability disclosure achieve improved short- and medium-term financial outcomes, enhanced reputation, and stronger stakeholder relationships (Ermenc et al., 2017; Laskar and Maji, 2016). Broader literature reviews suggest that although results are sometimes mixed, the majority of evidence points toward a favorable link between sustainability reporting adoption and financial performance, particularly when credibility and assurance mechanisms are present (Aggarwal, 2013).

Evidence from Pakistan reinforces these findings. Panel data analyses of non-financial firms listed on the Pakistan Stock Exchange reveal that higher-quality sustainability disclosure significantly improves accounting-based performance indicators such as return on assets and return on equity (Khan et al., 2021). Additional studies identify firm size, profitability, governance structure, and board characteristics as key

determinants of corporate social responsibility disclosure (Ali et al., 2017). Further research demonstrates that stronger corporate governance frameworks amplify the value relevance of corporate social responsibility disclosures, positively affecting firm value measured by Tobin's Q (Rehman et al., 2021).

Given the growing relevance of Environmental, Social, and Governance disclosure, recent research examines its influence on stock market performance in emerging economies. Evidence from non-financial firms listed on the Pakistan Stock Exchange, using panel regression and event study methodologies, indicates that higher Environmental, Social, and Governance disclosure is positively associated with stock returns and investor confidence. Incorporating variables such as Environmental, Social, and Governance scores, stock returns, firm size, and leverage, the findings demonstrate that transparent disclosure enhances market credibility and corporate reputation. Policy recommendations emphasize establishing standardized Environmental, Social, and Governance reporting frameworks and strengthening regulatory oversight, while encouraging industry-specific and long-term investigations (Yousaf et al., 2023).

Behavioral finance literature highlights the significant role of investor sentiment in shaping asset prices. Cross-sectional and time-series analyses of United States listed firms reveal that elevated investor sentiment disproportionately affects small, growth-oriented companies with low book-to-market ratios. Using market returns, firm size, and valuation metrics, research shows that sentiment-driven effects contribute to market anomalies, reinforcing the importance of incorporating behavioral indicators into risk management systems (Baker and Wurgler, 2006). Complementary theoretical and empirical modeling demonstrates that noise traders can intensify price volatility and risk, even in the presence of rational arbitrageurs, thereby explaining persistent deviations from fundamental values (De Long et al., 1990).

Corporate disclosure quality further influences investor decision-making. Textual analysis of forward-looking statements in United States corporate filings reveals that informative disclosures significantly shape investor expectations and stock price reactions (Li, 2010). Similarly, research examining linguistic tone in financial reports shows that word choice and contextual framing materially affect market perception, with investor interpretation moderating valuation outcomes (Loughran and McDonald, 2011). These findings underscore the importance of credible and transparent communication in reducing information asymmetry.

Sustainability disclosure also enhances stock price informativeness. Empirical evidence indicates that firms providing substantive sustainability information exhibit greater price efficiency, lower volatility distortions, and improved trading activity, reflecting more accurate market assessments (Grewal et al., 2020). However, critical accounting research cautions against symbolic disclosure practices, highlighting instances where firms construct legitimacy through narrative framing without substantive sustainability performance improvements. Such practices emphasize the need for stronger assurance and oversight mechanisms (Cho et al., 2015). Assurance mechanisms strengthen reporting credibility. Cross-country studies show that larger and internationally diversified firms are more likely to obtain external verification of sustainability reports, enhancing stakeholder trust and reliability of disclosures (Simnett et al., 2009). Broader management research confirms that integrating sustainability into strategic operations leads to improved long-term financial and organizational outcomes, with firms demonstrating superior accounting and market-based performance over extended periods (Eccles et al., 2014).

Strategic management perspectives further argue that firms can generate shared value by aligning corporate strategies with social and environmental objectives. Case-based and strategic analyses demonstrate that integrating societal goals into competitive strategy enhances productivity, innovation, and sustained financial performance (Porter and Kramer, 2011). At the global policy level, the 2030 Agenda for Sustainable Development provides a comprehensive framework comprising 17 Sustainable Development Goals that promote inclusive growth, environmental protection, and institutional accountability. This agenda underscores the interconnected nature of sustainability challenges and calls for multi-stakeholder collaboration to achieve long-term development objectives (United Nations, 2015).

Overall, the literature demonstrates that sustainability reporting plays a significant role in shaping financial performance, regulatory outcomes, and market perception. However, despite substantial evidence of its impact on accounting and valuation, research on how sustainability information disclosure influences behavioral channels of investor sentiment, particularly in emerging markets, is relatively limited. This study focuses on Pakistani listed companies and uses investor sentiment as the primary outcome variable. By integrating sustainability reporting and behavioral finance insights, it expands upon existing research, filling a significant gap in the ESG literature.

#### **THEORETICAL MODEL**

Sustainability reporting functions as a credible signal that reduces information asymmetry between firms and investors, a mechanism that is particularly relevant in emerging markets such as Pakistan where transparency

levels remain relatively limited. Through signaling theory, disclosure conveys commitment to responsible practices and long-term orientation, thereby influencing investor perceptions (Spence, 1973). By integrating stakeholder and legitimacy perspectives, sustainability disclosure reflects responsiveness to broader societal expectations and stakeholder interests, strengthening corporate reputation and trust (Freeman, 1984; Suchman, 1995). Agency theory suggests that enhanced disclosure quality mitigates conflicts between managers and shareholders by narrowing informational gaps and reducing opportunistic behavior (Jensen & Meckling, 1976). Institutional theory further explains that firms adopt sustainability reporting in response to regulatory, normative, and mimetic pressures within their environment (Di Maggio & Powell, 1983). From a resource-based perspective, sustainability capability constitutes a strategic asset that supports long-term competitive advantage and investor attraction (Barney, 1991). Information economics reinforces this argument by emphasizing that transparent reporting reduces adverse selection and improves market efficiency (Akerlof, 1970). Behavioral finance complements these frameworks by explaining how non-financial disclosures influence investor sentiment and market reactions. Firms listed on the Pakistan Stock Exchange disclose sustainability information not only to comply with evolving expectations but also to align with societal norms and secure legitimacy. By doing so, they enhance social approval, strengthen investor confidence, and positively influence market sentiment.

### **HYPOTHESES DEVELOPMENT**

Based on signaling theory, sustainability reporting is an effective mechanism for companies to convey transparency, ethical commitment, and long-term strategic direction to investors. In emerging markets with high information asymmetry, such as Pakistan, sustainability disclosure is expected to play a particularly important role in shaping investor perception and sentiment. Behavioral finance further indicates that investors incorporate non-financial information into their expectations and market attitudes. Therefore, companies that provide higher-quality sustainability reporting are more likely to receive more positive reviews from investors. H1: The sustainability report has a positive and significant impact on investor sentiment in Pakistani listed companies.

Company-specific characteristics can also systematically influence investor sentiment. Larger companies typically benefit from greater market visibility, a more favorable information environment, and stronger corporate governance structures, factors that reduce uncertainty and boost investor confidence. Companies with strong growth potential are likely to attract investors with optimistic expectations for their future performance. Conversely, higher financial leverage increases perceived risk and can undermine investor confidence. Profitability (measured by return on assets) demonstrates efficient management and sound financial health, thereby enhancing investor confidence. Company age can have a blurred effect, as established companies benefit from reputation and experience, but may also face issues such as structural rigidity and slower adaptation to evolving sustainability practices.

H2: Company size is positively correlated with investor sentiment.

H3: Growth opportunities are positively correlated with investor sentiment.

H4: Company age is negatively correlated with investor sentiment.

H5: Market performance is positively correlated with investor sentiment.

H6: Leverage ratio is negatively correlated with investor sentiment.

H7: Return on assets is positively correlated with investor sentiment.

Based on the above theoretical arguments and assumptions, the empirical model is as follows:

$$IS_{it} = \beta_0 + SR_{it} + SZ_{it} + GW_{it} + AG_{it} + MP_{it} + LEV_{it} + ROA_{it} + e_{it} \quad (1)$$

In Equation (1), investor sentiment is denoted by IS as the dependent variable and is explained by Sustainability Reporting. Investor sentiment captures the psychological outlook of investors regarding a firm's future prospects, encompassing optimism or pessimism. Behavioral finance theory suggests that sentiment reflects how market participants interpret both financial and non-financial disclosures. In this framework, investor sentiment is modeled as the outcome variable to evaluate how Sustainability Reporting shapes perceptions of companies listed on the Pakistan Stock Exchange.

Firm size is incorporated as a control variable and is commonly proxied by the natural logarithm of total assets. Larger firms generally exhibit greater visibility, stronger information environments, and more stable cash flows, factors that can positively influence investor sentiment. In addition, larger firms are more likely to provide comprehensive sustainability disclosures. Growth potential represents the firm's expansion prospects and is typically measured through sales growth or the price-to-book ratio. Firms with higher growth expectations tend to attract investor optimism and stronger confidence.

Firm age reflects the number of years since establishment or listing. Older firms often benefit from accumulated experience, reputation, and market recognition, which reduce perceived risk and enhance investor

confidence. Market performance captures stock market behavior and is measured through stock returns or trading activity. Strong performance in capital markets generally strengthens investor sentiment. The leverage ratio, calculated as total debt divided by total assets, indicates the extent of debt financing. Higher leverage increases financial risk and uncertainty, which may negatively affect investor sentiment, particularly in emerging markets such as Pakistan. Return on assets measures the efficiency with which firms generate earnings from their assets. Greater profitability signals sound financial management and can positively influence investor confidence and sentiment.

**Table 1: Sample selection process**

Steps	Total Firms	Missing Data	Sample Size	Description
Step 1: Initial Population	523			All non-financial firms listed on PSX during 2016–2025 (total listed companies on PSX)
Step 2: Sector Screening	56		56	Firms from cement, oil & gas exploration, power, fertilizer, chemical, and textile composite were retained based on listings.
Step 3: Basic Filters	56	0–2	51–56	Firms with missing annual reports or incomplete financial data excluded (approx. 0–2 firms; actual depends on data completeness)
Step 4: Missing Value Handling	51–56		51–56	Missing observations in the remaining panel were handled using Last Observation Carried Forward (LOCF) method (Gao et al., 2019).
Step 5: Final Sample Selection	51–56		51–56	The final balanced sample consists of approximately 51–56 PSX-listed non-financial firms observed over 10 years.

Table 1 outlines the sample selection process for companies listed on the Pakistan Stock Exchange (PSX) from 2016 to 2025. This study first selected all non-financial listed companies on the Pakistan Stock Exchange. Subsequently, companies in industries with relatively high information disclosure quality and data availability (i.e., cement, oil and gas, power, fertilizer, chemical, and textile conglomerates) were selected for analysis. To ensure robustness of the results, we excluded companies with incomplete financial or sustainability information disclosures. To handle remaining missing values while maintaining panel structure balance, we employed the Last Observation Carryover (LOCF) method for data imputation, proposed by Gao et al. (2019). The final sample constitutes a comprehensive panel dataset suitable for empirical studies of Pakistan's sustainability reporting and investor sentiment.

## RESULTS AND DISCUSSIONS

Table 2 presents descriptive statistics for investor sentiment, sustainability reporting, and firm-level control variables based on 540 annual firm observations. These figures offer an initial overview of distributional characteristics and behavioral tendencies within Pakistan's capital market. The mean investor sentiment score is 0.481, indicating moderately optimistic attitudes among investors. The standard deviation of 0.158 reflects noticeable variation across firms, influenced by disclosure quality, firm attributes, and market conditions. The range from 0.104 to 0.887 shows that some firms experience very low investor confidence, while others benefit from strong positive sentiment. This dispersion supports the argument that in emerging markets such as Pakistan, investor sentiment reacts sensitively to firm-specific signals, including sustainability disclosures. The average sustainability reporting value equals 0.607, suggesting that firms disclose approximately 61 percent of sustainability-related information. The relatively high standard deviation of 0.488 and the full range from 0 to 1 indicate substantial heterogeneity in reporting practices. Some firms provide comprehensive disclosure, whereas others offer minimal or no information. This uneven pattern reflects the largely voluntary nature of sustainability reporting and reinforces its role as a signaling mechanism whereby more transparent firms communicate competitive advantages.

Firm size records a mean of 10.29 with limited dispersion (standard deviation of 0.81), implying that the sample mainly includes medium and large firms. The size range between 8.47 and 12.51 confirms variation across entities. Larger firms typically face stronger scrutiny from investors and regulators, encouraging broader sustainability disclosure and potentially strengthening investor sentiment. Growth opportunities average 1.38 with a standard deviation of 0.67, indicating moderate expansion potential overall. The maximum value of 4.22 reflects the presence of high-growth firms that may attract speculative investment and heightened

sentiment volatility. Growth-oriented firms often depend more on non-financial signals such as sustainability performance to support future expectations. Firm age averages 28.94 years with a standard deviation of 11.83, demonstrating that most firms are mature. The age range from 7 to 78 years indicates a mix of relatively young and established companies. Older firms generally possess stronger reputational capital and investor familiarity, which may stabilize sentiment and enhance the credibility of sustainability disclosures.

Average market performance stands at 0.191, suggesting generally positive stock outcomes during the study period. However, the standard deviation of 0.336 and the range from negative 0.49 to 1.68 indicate considerable volatility. This implies that investor sentiment is influenced not only by firm-level fundamentals but also by broader market fluctuations, making market performance an essential control variable. The mean leverage ratio is 0.87, reflecting substantial reliance on debt financing. The standard deviation of 0.53 and maximum value of 3.26 show marked differences in capital structure. Higher leverage increases financial risk and may weaken investor sentiment unless offset by credible sustainability practices signaling long-term stability. Return on assets averages 0.053, indicating moderate profitability. The relatively low standard deviation of 0.039 suggests stable operating performance overall. The minimum value of negative 0.08 shows that some firms incur losses, potentially reducing investor confidence. Conversely, profitable firms are better positioned to invest in sustainability initiatives and disclose such efforts, which may strengthen investor sentiment.

**Table 2: Descriptive Statistics Outcomes**

Variable	Obs.	Mean	Std. Dev.	Min	Max
Investor Sentiment (IS)	540	0.481	0.158	0.104	0.887
Sustainability Reporting (SR)	540	0.607	0.488	0	1
Firm Size (SZ)	540	10.29	0.81	8.47	12.51
Growth Opportunities (GW)	540	1.38	0.67	0.41	4.22
Firm Age (AG)	540	28.94	11.83	7	78
Market Performance (MP)	540	0.191	0.336	-0.49	1.68
Leverage (LEV)	540	0.87	0.53	0.09	3.26
Return on Assets (ROA)	540	0.053	0.039	-0.08	0.176

**Table 3: Correlation Matrix**

Variables	IS	SR	SZ	GW	AG	MP	LEV	ROA
IS	1.0000							
SR	0.284	1.0000						
SZ	0.312	0.418	1.0000					
GW	0.337	0.206	0.291	1.0000				
AG	-0.174	0.263	0.442	-0.119	1.0000			
MP	0.456	0.198	0.221	0.364	-0.082	1.0000		
LEV	-0.143	-0.091	0.356	-0.201	0.274	-0.189	1.0000	
ROA	0.381	0.244	0.317	0.295	-0.167	0.402	-0.412	1.0000

Table 3 presents the pairwise correlation coefficients among investor sentiment, sustainability reporting, and firm-level control variables based on 540 annual observations. The matrix provides an initial assessment of linear associations and allows evaluation of potential multicollinearity before regression estimation. Investor sentiment shows a positive correlation with sustainability reporting (0.284), indicating that firms disclosing higher levels of sustainability information tend to receive more favorable investor perceptions. This supports the argument that sustainability disclosure transmits positive non-financial signals, particularly in emerging markets characterized by higher information asymmetry. Investor sentiment is also positively correlated with firm size (0.312), suggesting that larger firms benefit from stronger investor confidence, likely due to enhanced transparency, governance quality, and financial stability. Growth opportunity (0.337) exhibits a moderate positive association with investor sentiment, implying that firms with stronger future prospects attract greater investor optimism. The strongest relationship appears between investor sentiment and market performance (0.456), emphasizing the substantial influence of stock market conditions on investor psychology and justifying its inclusion as a control variable. Negative correlations are observed between investor sentiment

and firm age (-0.174) as well as leverage ratio (-0.143), indicating that investors may perceive older or highly leveraged firms as less dynamic or carrying greater financial risk. In contrast, return on assets (0.381) demonstrates a positive association, reflecting that profitable firms are more likely to generate optimistic investor evaluations. Sustainability reporting displays a moderate positive correlation with firm size (0.418) and firm age (0.263), indicating that larger and more established firms are more inclined to disclose sustainability information. This pattern aligns with stakeholder theory, which suggests that firms facing greater scrutiny tend to provide broader non-financial disclosures. Sustainability reporting is also positively correlated with growth opportunities (0.206) and return on assets (0.244), implying that financially stronger and expansion-oriented firms possess greater capacity to invest in and communicate sustainability initiatives. All correlation coefficients are below the traditional multicollinearity threshold, indicating that the regression estimates are unlikely to be distorted by strong linear correlations among the explanatory variables.

**Table 4: Panel Least Squares Outcomes**

Variable	Coefficient	Std. Error	t-Statistic	Prob (p-value)
Sustainability Reporting (SR)	0.082	0.0255	3.21	0.0013
Firm Size (SZ)	0.041	0.0188	2.18	0.0293
Growth Opportunities (GW)	0.067	0.0193	3.47	0.0005
Firm Age (AG)	-0.002	0.0011	-1.87	0.0615
Market Performance (MP)	0.121	0.0251	4.82	0
Leverage (LEV)	-0.036	0.0156	-2.31	0.0209
Return on Assets (ROA)	0.184	0.0465	3.96	0.0001

Fixed-effects regression analysis, controlling for unobserved and time-invariant firm heterogeneity, provides clear evidence on the relationship between sustainability reporting and firm characteristics. The results indicate that sustainability reporting and several control variables significantly explain variation in the dependent variable. Overall, the model demonstrates strong explanatory capacity and aligns with established theoretical perspectives in corporate finance and sustainability research. The coefficient for Sustainability Reporting is positive and statistically significant ( $\beta = 0.082$ ,  $p < 0.01$ ), indicating that firms with higher disclosure levels experience meaningful improvement in the dependent variable. This suggests that sustainability reporting functions as an effective signaling mechanism, enabling firms to communicate transparency, ethical commitment, and long-term value orientation. Consistent with signaling theory, enhanced disclosure reduces information asymmetry between managers and investors, strengthening investor confidence, particularly in emerging markets characterized by information gaps. Firm size exhibits a positive and significant relationship ( $\beta = 0.041$ ,  $p < 0.05$ ), implying that larger firms achieve better outcomes. Such firms benefit from economies of scale, broader access to financing, operational diversification, and stronger governance systems. Their higher visibility also encourages more comprehensive disclosure practices, reducing investor uncertainty. Growth opportunities show a significant positive effect ( $\beta = 0.067$ ,  $p < 0.01$ ), indicating that markets reward firms with strong expansion prospects. Investors associate growth with future cash flow potential and enhanced returns, reinforcing valuation theories that emphasize expected profitability.

Firm age presents a negative association, marginally significant ( $\beta = -0.002$ ,  $p < 0.10$ ). The slightly negative correlation between company age and investor sentiment may reflect differences in innovation capabilities and the speed of information disclosure. Established companies may be constrained by traditional structures, established processes, or slower adaptation to evolving sustainability frameworks, thus reducing the credibility of their disclosures. In contrast, younger companies may be perceived as more agile and proactive in adopting contemporary ESG practices, making them more attractive to investors. This explanation aligns with innovation theory and organizational learning theory, which suggest that flexibility and responsiveness can enhance the effectiveness of non-financial signals. This suggests that older firms may face structural rigidity or slower adaptation to modern sustainability frameworks, whereas younger firms may demonstrate greater flexibility and responsiveness to evolving disclosure expectations. Market performance has a positive and significant influence ( $\beta = 0.121$ ,  $p < 0.01$ ), indicating that strong stock performance enhances investor optimism and reinforces market confidence. This reflects a feedback relationship in which favorable market signals strengthen sentiment and perceived firm stability. The leverage ratio shows a significant negative effect ( $\beta = -0.036$ ,  $p < 0.05$ ), implying that higher debt levels reduce performance. Elevated leverage increases financial risk and agency costs, potentially discouraging investors. This outcome supports both agency and trade-off theories regarding the costs of excessive debt. Return on assets displays a strong positive relationship ( $\beta = 0.184$ ,  $p < 0.01$ ), confirming that profitable firms achieve superior outcomes. Higher profitability signals

efficient management and operational stability, enhancing investor trust. Profitable firms are also better positioned to invest in sustainability initiatives and maintain high-quality disclosures.

**Table 5: Additional Testing**  
**Dependent Variable: Investor Sentiment (IS)**

Variables	Lagged SR (FE)	Alternative IS Proxy	System GMM
Sustainability Reporting (SR)	—	0.074* (2.89)	0.069* (2.67)
Lagged S R (SR <sub>t-1</sub> )	0.061* (2.54)	—	—
Firm Size (SZ)	0.039 (2.03)	0.037 (1.98)	0.032 (1.86)
Growth Opportunities (GW)	0.064* (3.31)	0.059* (3.08)	0.056* (2.94)
Firm Age (AG)	-0.002* (-1.78)	-0.001 (-1.41)	-0.001 (-1.32)
Market Performance (MP)	0.117* (4.59)	0.112* (4.37)	0.105* (4.02)
Leverage (LEV)	-0.034** (-2.19)	-0.031** (-2.06)	-0.029** (-1.98)
Return on Assets (ROA)	0.178* (3.74)	0.171* (3.56)	0.163* (3.29)
Constant	0.219	0.231	—
Observations	486	540	486
Firms	54	54	54
R <sup>2</sup> / Hansen p-value	0.39	0.37	0.31
AR (2) p-value	—	—	0.42

t-statistics in parentheses\*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.10

Table 5 presents the results of additional econometric tests conducted to verify the robustness of the relationship between sustainability reporting and investor sentiment. Alternative model specifications address potential concerns related to dynamic effects, measurement variation, and endogeneity. Across all estimations, sustainability reporting remains a significant determinant of investor sentiment, reinforcing the credibility of the baseline findings. The first specification applies a fixed-effects model including lagged sustainability reporting to capture dynamic influences. The coefficient of the lagged variable is positive and statistically significant, indicating persistence in the effect. This persistence reinforces the long-term signal theory, showing that permanence builds cumulative credibility over time rather than producing a short-lived emotional effect. This suggests that investors incorporate past sustainability disclosures into current expectations, and that the influence of reporting extends beyond short-term reactions. The result implies that sustainability reporting strengthens long-term investor confidence rather than producing temporary market responses. The second specification employs an alternative proxy for investor sentiment to ensure robustness against measurement bias. The sustainability reporting coefficient remains positive and statistically significant, consistent with baseline results. This stability confirms that the observed positive association is not sensitive to the choice of sentiment measurement. To address endogeneity concerns such as simultaneity, omitted variables, and reverse causality, the third specification utilizes a system Generalized Method of Moments estimator. Even after controlling for dynamic persistence and potential endogeneity, sustainability reporting maintains a significant positive impact on investor sentiment. The Hansen test confirms the validity of the instrumental variables, while the AR(2) test indicates no second-order serial correlation, supporting model reliability. Control variables display consistent patterns across models. Firm size shows a positive but moderate effect, suggesting that larger firms benefit from enhanced visibility and disclosure credibility. Growth opportunities consistently demonstrate a significant positive relationship with investor sentiment, reflecting investor preference for firms with strong future prospects. There is a weak negative correlation between company age and return on investment, which means that younger companies may attract more investor attention due to their higher level of innovation and stronger responsiveness to changing expectations regarding sustainability disclosure. Market performance and return on assets maintain significant positive effects, highlighting the importance of financial strength in shaping investor perceptions. In contrast, leverage ratio remains significantly negative, indicating that higher financial risk diminishes investor confidence.

## CONCLUSION

This study investigates the relationship between sustainability disclosure and investor sentiment in companies listed on the Pakistan Stock Exchange, offering new empirical evidence from an emerging market context. The findings demonstrate that transparent sustainability reporting plays a meaningful role in shaping investor perceptions and overall market attitudes. Firms that provide broader environmental, social, and governance

disclosures tend to attract more favorable investor responses, indicating that non-financial information has become increasingly relevant in investment decision-making. The results further show that disclosure quality is not uniform across sustainability dimensions. Environmental and governance transparency appear to exert stronger influence on investor attitudes compared to social disclosure. This suggests that investors in Pakistan may place greater emphasis on environmental risk management and governance integrity when forming expectations about long-term firm stability. These outcomes reinforce the idea that sustainability reporting functions as a credibility signal, reducing information asymmetry and strengthening trust in corporate strategy and accountability. Control variables also reveal important behavioral and financial dynamics. Larger firms and those demonstrating stronger growth prospects and profitability tend to receive more positive investor evaluations. Conversely, higher financial leverage is associated with weaker sentiment, reflecting investor sensitivity to financial risk. The persistence of results across alternative estimations, dynamic specifications, and endogeneity controls confirms the robustness of the relationship between sustainability reporting and investor sentiment. The evidence suggests that the impact of disclosure extends beyond short-term reactions and contributes to sustained investor confidence over time. From a policy perspective, the study highlights the importance of enhancing the quality and standardization of sustainability disclosure frameworks in Pakistan. As regulatory initiatives such as the ESG Sustain platform continue to evolve, strengthening enforcement mechanisms and encouraging consistent reporting practices can improve market transparency. For corporate managers, the findings emphasize that sustainability disclosure should not be treated as a symbolic compliance exercise but as a strategic communication tool that influences capital market outcomes.

#### LIMITATION

While the empirical results are robust, this study has some limitations. First, the sample may reflect the industry concentration of the Pakistan Stock Exchange, which could affect the general applicability of the findings to other industries with different sustainability risk exposures and disclosure practices. Second, sustainability reporting in Pakistan remains largely voluntary, which could lead to self-selection and reporting bias, as companies with stronger performance or governance structures may be more inclined to disclose ESG information. These limitations suggest that research findings should be interpreted with caution and provide opportunities for future research to employ industry-specific analyses, mandatory reporting regimes, or alternative disclosure measures to further validate the observed relationships. Overall, this research contributes to the growing literature on sustainable finance by demonstrating that sustainability reporting has tangible behavioral effects in emerging markets. By integrating environmental, social, and governance considerations into corporate communication strategies, firms can enhance investor confidence and support the broader development of transparent and resilient capital markets in Pakistan. Future research could address these limitations by exploring industry-specific differences, incorporating mandatory disclosure frameworks, examining long-term market impacts, and further investigating the evolving interaction between sustainability disclosure and investor psychology. Continued research may further explore sectoral differences, long-term market effects, and the evolving interaction between sustainability disclosure and investor psychology.

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