Sustainability Disclosure and Firm Value: A Panel Analysis of Indian Pharmaceutical Companies

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Abstract

This research examines the impact of Environmental, Social, and Governance (ESG) disclosures on firm value within the Indian pharmaceutical sector from 2015 to 2025. Utilizing a panel data regression framework with fixed-effects estimation, the study analyses how composite ESG scores and individual pillars correlate with market performance as measured by Tobin's Q. Controlling for firm size, leverage, and age, the empirical results indicate that while aggregate ESG performance shows a statistically insignificant correlation with market value, the 'Social' pillar emerges as a significant positive driver of firm valuation.

These findings suggest that investors in emerging markets prioritise social impact and labour practices over environmental disclosures in specialized sectors like healthcare. The study provides critical insights for corporate managers and policymakers, suggesting that structural reforms in sustainability reporting should emphasise sector-specific metrics to enhance transparency and financial sustainability in transitional economies.

Keywords: ESG disclosure; firm value; Tobin's Q; Indian pharmaceutical industry; panel data analysis; sustainability reporting; emerging markets.

JEL Classification: G32; M14; O16; C23; L65.

Introduction

The pharmaceutical industry holds a strategically important status in the world economy since it has a direct effect on the health of the population, its economic performance, and social well-being. In comparison to other branches, pharmaceutical companies work in the area of scientific breakthroughs, ethical accountability, environmental regulations, and regulations (Mastrantonas et al., 2024). Their products are the key to life preservation and increase in the quality of life, but their activities are accompanied by great environmental hazards, such as chemical waste disposal, water contamination, and intensive energy consumption in the production (Singh et al., 2025). In the modern world, in which countries are becoming more and more geared in aligning their economic development with the demands of sustainability, this industry has been subject to growing pressure to strike a balance between profitability and societal and environmental responsibility (Srivastava, 2024).

The value of sustainability has increased during the years after the implementation of United Nations Sustainable Development Goals (SDGs) in 2015. Pharmaceutical operations directly overlap with such goals as SDG 3 (Good Health and Well-being), SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) (Agrawal et al., 2024). As a result, investors, regulators, and society are becoming more demanding of pharmaceutical companies to incorporate Environmental, Social, and Governance (ESG) in their strategic plans (Bhattacharya & Bhattacharya, 2023). ESG reporting, therefore, has changed into being a voluntary reporting practice to a quasi-compulsory corporate responsibility tool that shapes investment choices and stakeholder trust (Spanò et al., 2025).

India is one of the most interesting settings to study the ESG-performance relationships within the pharmaceutical industry (Mangalagiri et al., 2026). India is considered as the pharmacy of the world, and it is among the major suppliers of generic medicines and vaccines in the world. Pharmaceutical sector in the country is a major export, job creator, and source of healthcare in the country (Kumar et al., 2025). At the same time, Indian pharmaceutical firms are under extensive scrutiny in pricing of drugs, clinical ethics, supply chain transparency, and adherence to the environment. The emergence of the Business Responsibility and Sustainability Reporting (BRSR) framework presented by the Securities and Exchange Board of India (SEBI) also resulted in the ESG disclosure frameworks being formalized and made compulsory with the top-thrusted entities (Gupta, 2026). It is with this development in regulation that can a proper institutional environment be offered to evaluate whether ESG reporting can deliver a kind of financial value.

The increased focus on responsible investment also makes the ESG even more applicable. To reduce the risks of sustainability in the long term and increase sustainable returns, institutional investors are increasingly using ESG measures to allocate their portfolios (Lopez-de-Silanes et al., 2024). Nevertheless, even though it is theoretically expected that ESG engagement positively impacts the promotion of reputation, minimization of risk, and boosting stakeholder trust, the evidence is rather divided, in particular in emerging markets (Gidage & Bhide, 2025). There is a lack of sector specific evidence especially in socially sensitive sectors such as pharmaceuticals.

The pharmaceutical companies occupy a specific place in the context of ESG discussions since the aspect of social responsibility is not limited to philanthropy (Bae et al., 2022). Low cost of medicine, patient safety, ethical clinical trials, and drug approvals transparency are some of the fundamental social pillars. At the environmental level, there are waste management, carbon emittance, and adherence to the global environmental standards (Onukwulu et al., 2023). Mechanisms of governance include the regulatory compliance, board supervision, risk management frameworks and reporting transparency. Thus, the study of ESG in its entirety in this industry gives a more profound understanding of the way sustainability efforts affect the firm valuation.

The significance of the research is that the study is sector-specific, India-specific, and empirical as it explores the relationship between ESG and firm value based on the Tobin Q as an indicator of market-based performance. Combining firm level controls and panel econometric methods the study will help fulfil the understanding that ESG integration creates tangible shareholder value in one of the most strategically important industries in India. In a time when capital markets are becoming more and more sensitive to sustainable conduct, the appraisal of ESG performance in the Indian drug industry is of scholarly and policy-important interest.

1. Literature Review

The worldwide move toward sustainable development and responsible investment has changed the rules for corporate accountability and disclosure in a big way (Nartey, 2024). Environmental, Social, and Governance (ESG) performance is now regarded not merely as an ancillary reporting practice but as a strategic factor influencing long-term competitiveness, resilience, and value creation (Noch, 2024). With the growing adoption of non-financial measures in investment decisions by capital markets, interest in the study of the ESG financial performance relationship has sharpened, generating a strong and dynamic entity of theoretical and empirical literature (Bani-Khaled et al., 2025).

Multiple interrelated theoretical views form the basis of the relationship between ESG performance and firm value (Huang, 2022). The stakeholder theory assumes that sustainable competitive advantage is created when firms satisfy the interests of various groups of stakeholders such as investors, regulators, employees, customers and communities. The implementation of ESG principles in strategic decision-making helps organizations to improve stakeholder trust and relational conflicts and to establish long-term legitimacy, which all add to the financial stability and overall performance (Waheed & Zhang, 2022).

The legitimacy theory also sheds more light by implying that the corporations can be seen as existing within a wider social contract. In order to continue gaining approval in the society and to have access to resources, companies are supposed to show that they are in line with the current environmental, ethical, and governance expectations.

ESG disclosure is a robust legitimacy, and it is an indicator of the compliance with responsible business practices (Akhter et al., 2023). In sectors like pharmaceuticals where the operations directly relate to the overall health of the population and environmental stability, the legitimacy is directly connected to the compliance of the regulation, trust towards the company, and the reputational capital (Liang & Gao, 2025).

Signalling theory builds upon these arguments by postulating that voluntary and transparent ESG reporting sends information on the managerial competence, strategic foresight, and effective risk management (Danesh, 2025). Investors perceive high ESG performance to reflect low operational risk and high quality of governance. As resource-based approach, ESG capabilities, i.e., sustainable innovation, responsible supply chain management, and governance transparency are valuable intangible resources that are hard to imitate and can be used to create long-term economic returns (Wang et al., 2025).

These theoretical foundations are generally supported by empirical syntheses. Most of the studies indicate that there are positive or neutral relationships between ESG engagement and financial performance. The sustainability activities seldom reduce the shareholder value, and in many cases, they help to increase the profitability, reduce the cost of capital, and mitigate risks and market valuation. Nevertheless, the extent and persistence of such a relationship depend on contextual factors such as regulatory systems, industry features and institutional maturity.

There are subtle and context-specific results, which are indicated by evidence in developed markets. The greater the level of ESG rating in an economy that has well-established regulatory environments, the more likely companies of higher rating tend to exhibit better market valuation, equity beats, and downside risk (Tang et al., 2025). Transparency of the environment and social responsibility is usually related to the increased corporate reputation and investor trust. But in the jurisdictions with sustainability reporting that are highly standardised and compulsory, the incremental financial value of ESG disclosure can decline, since ESG compliance is now more of a matter of expectation than competitive advantage in the strategy (Sellhorn & Wagner, 2024).

Other data show that ESG can be moderated by the governance structures. Although high levels of board independence and board oversight practices can strengthen the credibility of disclosures, the high levels of oversight can limit the managerial discretion, hence affecting performance outcomes (Vetrivel et al., 2025). These results demonstrate that ESG-performance relationship is a complicated issue even in the mature market.

The emerging economies have different dynamics because of the changing regulatory system and institutions transition, and increased market volatility (Zafar, 2023). ESG disclosure in these situations can be a more powerful signalling mechanism. Companies with better ESG results are also more likely to have a high-market-to-book ratio, investor better perception, and less financing limitations (Adeneye, et al., 2023). The marginal benefits of the credibility of the ESG reporting in such markets can be higher due to the fact that sustainability paradigms are being constructed and that differentiation among companies is more significant (Islam, 2025).

However, the results in the emerging markets are not homogenous. ESG impacts can be moderated or diluted by ownership concentration, the lack of effective enforcement mechanisms and differences in reporting quality (Zhang, 2025). Companies that work under the jurisdiction of weak regulatory authority might indulge in such practices of symbolic reporting that undermine the functionality of ESG as a value-creating tool (Elamer &. Boulhaga,

2024). Such cross-cultural differences support the requirement of empirical research that is industry-specific and country-oriented.

Recent studies are shifting towards a more disaggregated approach in defining ESG as Environmental (E), Social (S) and Governance (G) to information on differential valuation effects. It is indicated that social and governance factors tend to exhibit more short-term correlations with firm value than environmental performance (Wasiuzzaman et al., 2023).

The social pillar includes the labour practices, stakeholder engagement, product responsibility, and community development. Social performance is also crucial in such areas like the pharmaceutical sector, where it is linked to the safe treatment of the patient, ethical professional conduct, fair drug pricing, and the availability of life-saving medication (Bhattacharya & Bhattacharya, 2023). Effective social interaction increases the social trust and reputation status, which may result in a positive investor reaction.

Efforts by governance, such as the effectiveness of board, transparency, quality of audit, and risk management, are a key in enhancing ESG credibility (Colak & Sarioglu, 2025). Strong governance minimizes the agency conflicts, improves accountability, and boosts investor confidence. Subsequently, the standards of governance often enhance the positive impact of the entire ESG performance (Efunniyi et al., 2024).

Environmental projects, on the contrary, require a heavy capital investment and a more extended implementation period (Peng, 2024). Environmental preservation, waste control mechanisms and emission control plans do not necessarily have short term financial benefits. As a result, the negative effects on environmental scores are sometimes insignificant or temporary in nature, especially in industries that are cost-intensive (Mangalagiri et al., 2026). But in the long run, environmental responsibility helps to provide operational efficacy, regulatory conformity, and strategic resiliency.

Institutional and firm-level antecedents further moderate the relationship between the outcomes of ESG and financial performance (Luo et al., 2024). The ownership structure has a central impact on sustainability motivations: decentralized ownership and the involvement of foreign institutional investors have the tendency to increase ESG responsibility, but centralized ownership tends to focus on short-term financial gains (Zhu et al., 2025). Moreover, increased media exposure and transparency is a decisive factor; the more exposure a firm has, the more it is likely to introduce substantive ESG practices to defend reputational capital (Ahmed et al., 2025).

A system of executive remuneration that supports the focus of the managerial incentives on sustainability goals enhances the aspect of ESG integration and coherence in strategies (Usman & Yahaya, 2024). Conversely, the firm value can be significantly reduced by ESG controversies and green-washing programmes. Shallow reporting that does not involve a commitment to substantive operations weakens investor confidence and undermines long-term legitimacy (Liang & Gao, 2025). As a result, such dynamics accentuate the need of authentic, strategically entrenched ESG involvement as opposed to compliance-based reporting.

In the context of your research paper the literature review should be a critical synthesis of previous research in the subject field. The evaluation of the literature leads logically to research question, as: Who is doing what? Who has done what? Who first did it or published it? Taken from published papers, research monographs, catalogues etc. based on primary sources. Offering a, probably new, structured view of the field of study.

Also, keep in mind that this overview not only familiarises the reader with the foundational theories and concepts but also situates the current study within the broader scholarly discourse. Presenting a wide review of what is already known, the literature review identifies gaps or areas where further research is needed. This critical assessment helps justify the significance of the current study by highlighting unanswered questions or limitations in previous research that the current study aims to address.

Research Gap and Contribution

Despite the growing body of international literature, in regard to the Indian pharmaceutical sector, there is limited empirical data on the subject, which is sector-specific, related to the changing sustainability laws. A significant part of the prior research is based on cross-sectoral samples, thus overlooking the specific threats of operating in the environment, ethical concerns and governance issues, which are involved in drug business. Moreover, little attention has been given to pillar-level studies that use longitudinal panel techniques that can capture firm heterogeneity and dynamic interactions.

The study addresses these gaps by providing a focused empirical evaluation of both the composite or disaggregated ESG performance and their influence on market value in Indian pharmaceutical companies. Combining the firm-level control variables and applying effective panel econometric methods, this study is both an enrichment to the scholarship on sustainability and it is in line with current imperative of corporate governance and sustainable development.

Objectives of the Study

O1: To examine the impact of composite ESG performance on the market valuation (Tobin's Q) of Indian pharmaceutical companies.

O2: To analyse the individual effects of Environmental, Social, and Governance pillars on firm value.

O3: To assess the influence of firm-specific characteristics (size, leverage, asset base) on the ESG - firm value relationship.

2. Research Methodology

The proposed research design can be described as a quantitative and explanatory study aimed to examine the connection between the ESG performance and the firm valuation in the Indian pharmaceutical industry in the years 2015 to 2025. The temporal horizon is chosen intentionally and theoretically justified: 2015 is the year when the United Nations Sustainable Development Goals (SDGs) and the Paris Climate agreement were adopted, which significantly stimulated the process of ESG integration and sustainability disclosure on a global scale. The decision to widen the horizon to 2025 would allow tracing the development of ESG reporting in India, especially with more advanced regulatory tools, including Business Responsibility and Sustainability Reporting (BRSR) framework by the Securities and Exchange Board of India and investor interest in responsible investment (Ray, 2025). This ten-year panel provides sufficient time series variation to determine the economic impact (both short run and medium run) of ESG engagement.

The sample includes pharmaceutical companies listed on the Bombay Stock Exchange (BSE), including the constituents of such sustainability indices as S&P BSE ESG-related indices and the S&P BSE 500 Index. A balanced panel is developed to ensure consistency and comparability amongst entities and across time. The research relies solely on secondary sources as they are based on credible and popular databases, such as Bloomberg ESG, Thomson Reuters Refinitiv, MSCI ESG ratings, annual reports of firms, sustainability reports, and official stock exchange announcements. Financial parameters are obtained via audited annual reports and supported market databases hence guaranteeing the reliability and accuracy of data.

The firm performance measure used is the market-based valuation measure, called Q.Tobin, which summarizes the perceptions of the investors regarding the growth potential of the firm and the creation of intangible value (Butt et al., 2023; Ghani et al., 2023). The ESG performance is measured in terms of an aggregate ESG score as well as its component dimensions, namely, the Environmental (E), Social (S), and Governance (G) ones, thereby allowing both aggregate and pillar-level analyses (Abdul Razak et al., 2023; Singh & Sørensen, 2024). To explain the firm-specific heterogeneity, the empirical model uses control variables such as firm size (measured by total assets or market capitalisation), financial leverage (debt-to-equity ratio) as well as firm age, as they may independently affect market valuation (Sanoran, 2026).

The study employs the panel regression methods especially the Fixed Effects Model (FEM) as the panel nature of the data is recognised so that it can explain the unobserved firm-specific attributes that would prevail across time. The selection of the model is supported by statistical diagnostic tools like Chow test, Hausman test that determine the appropriateness of the fixed or random effects (Ferdiansyah et al., 2025). In a bid to combat the possibility of endogeneity particularly reverse causality between firms' performance and investment in ESGs, the study includes lagged ESG variables (Nguyen et al., 2022). The unit-root tests of stationarity, Variance Inflation Factor (VIF) of multicollinearity tests, and tests of heteroskedasticity and autocorrelation are performed in order to confirm the robustness and accuracy of estimates (Ebiwonjumi et al., 2023).

The methodological framework combines longitudinal data analysis with firm-level controls to give a strict, sector-specific look at the relationship between ESG and firm value in the Indian pharmaceutical industry. This is in line with current discussions about corporate governance that are based on sustainability and the SDGs.

3. Data Analysis and Results

Precise predictions depend on the fact that data series are stationary at a uniform level. Based on this, the unit root test in EViews 12 was used to evaluate the stationarity of all the chosen data series of variables. The findings showed that original data series of all the specified variables achieved stationarity at the 5 percent level of significance. The model 1 is given as Eq (1):

Model 1: $TQ_{it} = \beta_0 + + \beta_1 E_{it} + \beta_2 S_{it} + \beta_3 G_{it} + \beta_4 \, LEV_{it} + \beta_5 \ln FA_{it} + \beta_6 FS_{it} + \epsilon_{it}$ (1)

The model analyses how the scores of Environmental (E), Social (S), and Governance (G) have had a unique influence on market value based on the Q of Tobin. It separates the elements of ESG, which in turn clarifies which sustainability dimension has the most significant impact on the value of firms in the Indian pharmaceutical industry. Structural financial

characteristics are obtained through control variables, such as firm size, leverage, and firm age.

Redundant Fixed Effects Tests/ Chow Test

H0: POLS is the best model.

Ha: FEM is the best model.

Table 1. Chow Test

Effects Test	Statistic	d. f.	Prob.
Cross-section F	56.151968	-99,793	0.000
Cross-section Chi-square	1872.637949	99	0.000

Source: Authors' work

The results of the Chow test that is presented in Table 1 compare the Pooled OLS and the Fixed Effects Models (FEM). The statistically significant F-statistic and the chi-square values ($p < 0.05$) reject the null hypothesis and, thus, prove the existence of firm specific fixed effects and the FEM is more appropriate to use with the panel data.

Correlated Random Effects - Hausman test

H0: REM is the appropriate model.

Ha: FEM is the appropriate model.

Table 2. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d. f.	Prob.
Cross-section random	54.51078	7	0.0000

Source: Authors' work

Table 2 presents a Hausman test statistic that was used to test the suitability of the Fixed Versus Random Effects assessment. The large chi-square value ($p < 0.05$) supports the Fixed Effects model hence confirming the relationship between the individual firm's heterogeneity and the explanatory variables.

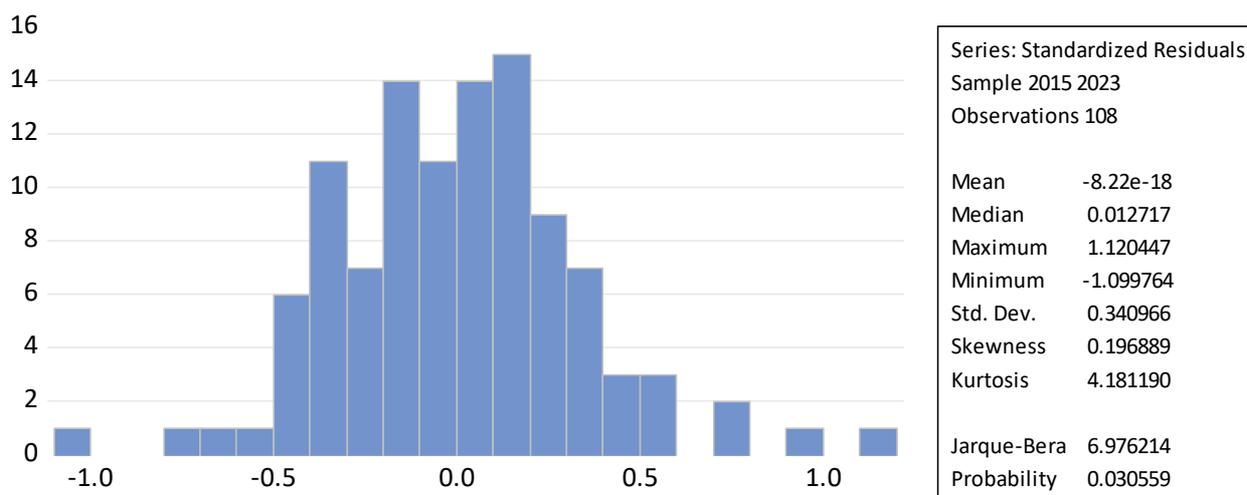## Classic test / Normality test (Jarque Bera Test Results)

Before estimating a panel data regression model, a set of classical assumption diagnostics should be undertaken. They are also heteroscedasticity, multicollinearity, autocorrelation, and normality tests. A normality test using Jarque Bera was conducted to assess data distribution.

H0: Data is normally distributed.

Ha: Data is not normally distributed.

Figure 1. Classic Test / Normality Test

Series: Standardized Residuals
Sample 2015 2023
Observations 108

Mean	-8.22e-18
Median	0.012717
Maximum	1.120447
Minimum	-1.099764
Std. Dev.	0.340966
Skewness	0.196889
Kurtosis	4.181190
Jarque-Bera	6.976214
Probability	0.030559

Source: Authors' work

Figure 1 shows the Jarque-Bera normality test for Model 1. The rejection of the null hypothesis signifies a non-normal distribution of residuals; yet, due to the panel structure and sufficient sample size, the estimators remain consistent and dependable.

Table 3. Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.999634	0.996322	7.025475	0.0000
E_Score	-0.00198	0.003824	-0.516612	0.6067
S_Score	0.019292	0.007781	2.479445	0.015
G_Score	-0.01914	0.007069	-2.707699	0.0081
Leverage	0.141391	0.259335	0.545206	0.587
Firm age	-0.07995	0.260841	-0.306513	0.7599
Firm size	-0.01153	0.019099	-0.603416	0.5477
R-squared	0.882513			
Adjusted R-squared	0.860321			
F-statistic	39.76705			
Prob (F-statistic)	0.000000			

Source: Authors' work

The estimates of fixed-effects regression of individual influence of Environmental, Social and Governance scores on Tobin Q is reported in Table 3. The social pillar shows a positive and statistically significant relationship, the Governance pillar portrays a significant negative relationship, and the Environmental performance is not significant. The fact that R-squared is found as high, at 0.88, is a testimony to the strong ability to explain. The model 2 is given as Eq (2):

Model 2: $TQ_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 LEV_{it} + \beta_3 lnFA_{it} + \beta_4 FS_{it} + \epsilon_{it}$ (2)

The specification examines the question of whether aggregate ESG performance is anchored on firm valuation. It embodies a combined sustainability impact which portrays a whole bodied ESG practice and not individual practices.

Redundant Fixed Effects Tests/ Chow Test

H0: POLS is the best model.

Ha: FEM is the best model.

Table 4. Chow Test

Effects Test	Statistic	d. f.	Prob.
Cross-section F	33.68529	(11,92)	0.0000
Cross-section Chi-square	174.4136	11	0.0000

Source: Authors' work

Table 4 shows that FEM is better than pooled regression for the composite ESG model. The significant test statistics show that pharmaceutical companies are different from each other in a cross-sectional way.

Hausman test

H0: REM is the appropriate model.

Ha: FEM is the appropriate model.

Table 5. Hausman Test

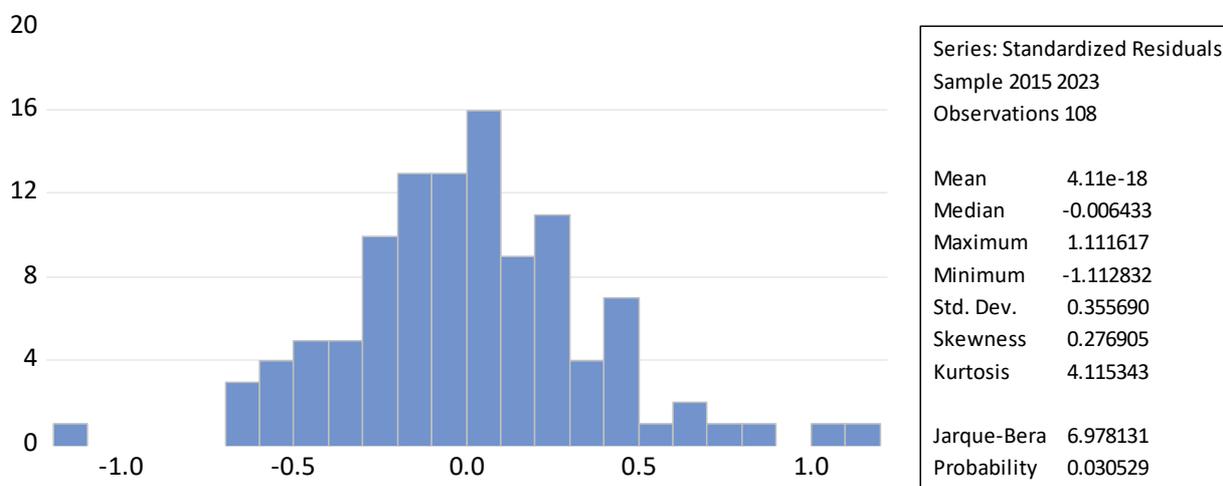| Test Summary	Chi-Sq. Statistic	Chi-Sq. d. f.	Prob.
Cross-section random	16.28477	4	0.0027

Source: Authors' work

Table 5 validates the selection of the Fixed Effects Model for Model 2. The significant Chi-square statistic suggests that Random Effects would yield biased estimates.

Classic Test Assumptions (Jarque Bera Test Results)

H0: Data is normally distributed.

Ha: Data is not normally distributed.

Figure 2. Jarque Bera test results

Series: Standardized Residuals	
Sample 2015 2023	
Observations 108	
Mean	4.11e-18
Median	-0.006433
Maximum	1.111617
Minimum	-1.112832
Std. Dev.	0.355690
Skewness	0.276905
Kurtosis	4.115343
Jarque-Bera	6.978131
Probability	0.030529

Source: Authors' work

Figure 2 shows the normality tests for Model 2. Even when the residuals don't follow a normal distribution, the panel regression estimations are still statistically strong.

Table 6. Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.882999	0.878267	6.698419	0.0000
ESG SCORE	-0.097611	0.002895	0.488239	0.6265
Firm Age	0.050466	0.254417	0.353953	0.7242
Firm Size	-0.118551	0.018791	0.170127	0.8653
Leverage	-0.10864	0.23129	-0.46971	0.6397
R-squared	0.872146			
Adjusted R-squared	0.8513			
F-statistic	41.83809			
Prob (F-statistic)	0.000000			

Source: Authors' work

The aggregate ESG score's effect on firm value is seen in Table 6. There is a positive but not statistically significant link between ESG and Tobin's Q. With an R-squared of 0.87, the overall model is important (F-statistic p = 0.000).

Table 7. Multicollinearity Test through VIF

Variable	VIF	1/VIF
ESG score	1.05	0.949617
S_score	6.87	0.145578
G_score	4.38	0.2248
E_score	2.35	0.426404
FS	1.93	0.518578
FA	1.89	0.528791
LEV	1.07	0.938698
Mean VIF 2.791		

Source: Authors' work

Table 7 shows the Variance Inflation Factor (VIF) values for each of the independent variables. Because all VIF values are below the usual cut-off of 10, multicollinearity is not a problem, which means that the regression coefficients are reliable (Kalnins & Praitis Hill, 2025; Chakraborty et al., 2025). The findings of this multicollinearity test can be used for any model.

4. Discussion and Results

The empirical findings of the study provide comprehensive and sector-specific insights into the ESG–firm value relationship within the Indian pharmaceutical industry, directly addressing the stated objectives. The first objective was to examine the impact of composite ESG performance on market valuation. The results indicate that the overall ESG score exhibits a positive but statistically insignificant relationship with Tobin's Q. Despite the fact that the coefficient direction indicates that there is no form of punishment to sustainability engagement by the market, the lack of statistically significant result suggests that the performance of aggregated ESG does not necessarily win a valuation premium in the short-run to medium-

run. This finding shows the likelihood that investors of emerging markets like India may still focus on traditional financial measures as compared to composite sustainability measures, or that ESG reporting is viewed as a compliance-based measure as opposed to one that is strategically transformative.

A possible reason why this weak association exists is because there are greenwashing issues in the emerging markets like India. Investors may perceive aggregated ESG scores with caution if disclosures are viewed as symbolic, compliance-oriented, or lacking substantive operational backing (Nagina, 2026). Where reporting ESG is motivated by regulatory requirements, rather than sound strategy, market participants may undercut the credibility of such reporting, undermining the value of such reporting. This is consistent with legitimacy-based arguments that signalling superficial sustainability can undermine investor trust as opposed to increasing firm valuation.

The other complementary explanation is associated with the relative immaturity of Indian capital markets in pricing non-financial information. Indian investors might still focus on conventional financial measures like earnings growth, cash flows, and risk-adjusted returns as opposed to the ESG metrics which are gradually becoming part of the valuation model in developed markets. Consequently, the market might not yet access the long-term economic benefit of ESG engagement in a full manner, especially when ESG is not measured as a composite score, but rather by pillar-specific performance. This gives an implication that the effects of ESG valuation in India are likely to be delayed and dependent on more advanced market and standardization of disclosure.

Conversely, the second objective, which is to analyse the impacts of Environmental, Social and Governance pillars on individuals, gives more differentiated and significant information. The Social pillar shows statistically significant positive relationship with firm value. This finding is highly intuitive considering that the sector has a direct contact with population health, patient care, and societal confidence. The pharmaceutical companies are in a place where ethics, stakeholder involvement, and societal acceptance are core in the survival and success of business in the long-term.

Under the Social dimension, Product Safety is a value driver that is essential in the pharmaceutical sector. By assuring stringent quality management, adherence to clinical trial protocols, pharmacovigilance mechanisms and open drug approval procedures, this has a direct impact on investor trust and a corporate image. Product safety failures like drug recalls, unfavourable clinical results, or government actions will have a devastating impact on firm value and stakeholder confidence. On the other hand, well-developed safety standards are an indicator of operational excellence, ability to manage risk, and adherence to ethical values, thus, improving the image in the market and minimizing reputational risk. Product safety cannot be considered only as a compliance issue in the field where patient lives depend directly on the sustainable competitive advantage, as it is a fundamental one.

The other critical social value driver is Community Engagement. The initiatives of pharmaceutical companies participating in the health awareness campaigns, equal access to drugs, outreach healthcare, and low-cost pricing policies enhance the social legitimacy of the company. Interaction with local communities, NGOs and local public health institutions enhances trust by stakeholders and creation of reputational capital. In countries such as India that have healthcare access and affordability as major policy concerns, companies that have proven to be highly committed to their community tend to be viewed as socially responsible and developmental oriented hence positive investor sentiment is likely to be received.

Further, corporate legitimacy, and trust with the public are influenced directly by such social performance indicators as equitable drug prices, standards of patient safety, and ethical clinical trials, accessibility to healthcare, and open stakeholder interaction. Considering SDG 3 (Good Health and Well-being), socially responsible firms seem to increase investor confidence and improve their perception in the markets. It appears that the market is rewarding pharmaceutical firms that are keen on contributing towards the well-being of the society besides presenting responsible practices in healthcare delivery.

The Governance pillar on the other hand shows statistically significant negative association with the firm value. This paradoxical outcome can indicate a number of dynamics behind the approach. To enforce stronger governance mechanisms, the compliance costs, the regulatory tightening, and structural modification are usually involved that can restrict managerial flexibility in the short term. Notably, this finding needs to be viewed within the framework of the current structural governance reforms in India, i.e., the implementation of Business Responsibility and Sustainability Reporting (BRSR) framework provided by the Securities and Exchange Board of India. The BRSR framework that is required to be applied by the top-listed companies greatly increases the disclosure obligations regarding the governance by accentuating board responsibility, ethical practices, risk management policies, stakeholder complaint processes, and decision-making transparency. Although these reforms are meant to improve long term corporate accountability and investor protection, the immediate effect of these reforms may be viewed by the market players as compulsory but not value-additional measures. The intensified disclosure of governance under BRSR may be perceived by the investors as evidence of regulatory pressure or amelioration, and not proactive strategic governance, and it, therefore, has a negative impact on short-term market valuation.

Moreover, the governance reforms can also be viewed as a reaction to the inefficiencies of the past, regulatory rigor, or sectoral risks, particularly in a very regulated sector like pharmaceuticals. In emerging markets like India, where ESG valuation frameworks are still evolving, the market may not yet fully internalize the long-term risk-mitigating and credibility-enhancing benefits of governance reforms embedded within the BRSR regime. Nevertheless, despite its short-term negative valuation effect, robust governance remains a foundational pillar of sustainable value creation. As BRSR implementation matures and disclosure quality improves, governance mechanisms are likely to enhance investor confidence, reduce information asymmetry, and strengthen institutional trust, potentially translating into positive valuation effects over the long run. Thus, the observed negative association should be viewed as transitional rather than structural. However, well-established governance is a core of long-term sustainability, mitigation of risks, and institutional credibility. Further, investors can view governance strengthening as a remedial reaction to historical incompetence or regulatory issues, as opposed to a proactive value-creation plan, and hence have a negative impact on short-term valuation metrics.

There is a negligible relation of environmental performance with the Tobin Q. The latter is in line with the realization that environmental projects like waste management systems, emission reduction equipment, and sustainable production processes are capital intensive and only have long term payoffs. The economic markets might not rapidly internalize the long-term worth of environmental stewardship, especially in the manufacturing industries that are cost conscious. Nevertheless, it is important that environmental responsibility is used to develop SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action), due to environmental hazards linked to the production of pharmaceuticals and the disposal of

chemical wastes. In the Indian pharmaceutical context, environmental programmes like waste treatment, emission reduction and green manufacturing can also be considered as regulatory requirements and not competitive differentiation hence limiting their immediate valuation impact.

The third objective explored how the firm-specific control variables; firm size, leverage, and the age of the firm affect market valuation. The findings show that these conventional financial determinants are not significant in influencing Tobins Q in the model. This can be interpreted to mean that the variables which relate to sustainability offer ancillary explanatory value in addition to traditional financial measures, which supports the importance of ESG factors when it comes to assessing firm performance.

Overall, the results indicate that the value creation process by sustainability in the Indian pharmaceutical market is more largely based on social legitimacy and trust with the stakeholders instead of environmental compliance or governance systems alone. The insignificant impact of aggregate ESG scores underscores the need for deeper, more credible ESG integration and greater market maturity in evaluating non-financial disclosures. As ESG reporting frameworks such as BRSR continue to evolve, and as investor awareness improves, the valuation relevance of holistic ESG performance may strengthen over time. ESG integration should thus go beyond the symbolic disclosure to be strategically incorporated into the operations of the corporations to create a long-term market-value.

5. Implications

The current research has substantive managerial, policy and societal impact. On the managerial side, pharmaceutical companies need to move away individual efforts into an integrated ESG approach. The strong impact of the social aspect suggests that the companies should emphasize on the ethical healthcare provision, openness in reporting clinical trials and fair availability of pharmaceuticals. The aspect of sustainability must be integrated into the major processes, innovation policies, and value-creation frameworks in the long-run.

Policy wise, regulatory bodies like the Securities and Exchange Board of India (SEBI) must proceed to strengthen the ESG reporting policy in Business Responsibility and Sustainability Report (BRSR). Since the effect of composite ESG performance is negligible, policymakers might find it necessary to improve the quality of reporting, comparability and enforcement as a way of delivering material sustainability integration. The relevance of valuations could be enhanced with industry-specific ESG models that respond to environmental risks of pharmaceutical firms and ethical commitments.

In the context of an investor, the results indicate that the market participants distinguish between the ESG pillars. Social accountability seems to be more deeply value -relevant than environmental performance. The investors ought to consider the long-term perspective that would examine environmental investments as a risk-reduction measure in line with the Sustainable Development Goals (SDGs).

The study supports matching the pharmaceutical sustainability practices with national development priorities, which is adequately supported on the societal level. The ESG integration is added to SDG 3, SDG 9 (Industry, Innovation and Infrastructure), SDG 12, and SDG 13. The increased implementation of ESG will contribute to the increase in public trust and environmental care as well as ethical company behaviour, which will support the vision of sustainable industrial India.

Conclusion

This paper is an empirical study that examine the connection between ESG performance and firm value in the Indian pharmaceutical industry using panel data. The findings show that composite ESG performance has a positive relationship with the market valuation but it is statistically irrelevant. The social pillar on the other hand has a great improvement in the value of the firm, the governance shows a negative correlation and the environmental performance is statistically unimportant. These results emphasize the fact that social legitimacy and stakeholder confidence contribute most to the creation of sustainability value by pharmaceuticals as opposed to environmental compliance only. ESG integration therefore needs to be planned in corporate structures, instead of being a token reporting process.

The study would make a contribution to ESG literature by providing industry-specific evidence in the context of SDG-oriented corporate governance and changing sustainability regulations in India, which would support the need of genuine and long-term sustainability engagement to have both financial and social impacts.

The study's sample size and concentration on publicly traded pharmaceutical companies may limit its generalizability. Subsequent research may encompass cross-country comparisons, integrate dynamic panel models like System-GMM, and incorporate supplementary performance indicators such as ROA or cost of capital. Qualitative evaluations of ESG quality and industry-specific environmental indicators may yield more profound insights. Longitudinal investigation after 2025 may further assess the enduring sustainability effects of enhanced BRSR regulations. Broadening the paradigm to include mediation or moderation impacts would enhance comprehension of ESG-driven sustainable value generation.

Credit Authorship Contribution Statement

All authors contributed to the conceptualization of this study. Chakraborty, J. was responsible for methodology design, data collection, data curation, investigation, formal analysis, visualization, drafting of the original manuscript, and project administration. Nagina, R. contributed to supervision, validation, interpretation of findings, critical review and editing, writing review, final refinement of the manuscript, and handling all journal correspondence. Salam, F. contributed to literature review support, secondary data compilation, and reviewing and editing of manuscript sections. Paruthi, M., contributed to data organization, manuscript structuring, and review of the conceptual framework. Saran, R. contributed to proofreading, reference management, and final manuscript revisions.

Acknowledgments/Funding

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability Statement

The datasets generated and analysed during this study form part of the ongoing PhD research work of the primary author. Due to academic and institutional restrictions, the data cannot be made publicly available at this stage. However, the data may be provided upon reasonable request to the corresponding author, subject to approval and confidentiality considerations.

Ethical Approval Statement

Ethical approval was waived due to the use of secondary data sources and the retrospective nature of the study. All data used were either publicly available or derived using custom text-mining scripts, and no human participants were involved.

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