

A Bibliometric Analysis of Environmental, Social, and Governance (ESG) Practices and Their Impact on the Financial Performance of Tata Motors Limited

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Abstract- *Environmental, Social and Governance (ESG) performance is increasingly treated as a determinant of, rather than a distraction from, corporate financial performance. This study examines the ESG trajectory of Tata Motors Limited, on a consolidated basis inclusive of Jaguar Land Rover, over five fiscal years (FY 2020-21 to FY 2024-25), and evaluates its association with the company's financial performance over the same period. Drawing on annual reports, integrated sustainability reports, Business Responsibility and Sustainability Reports (BRSR), and audited consolidated financial statements, the study tracks seven ESG dimensions climate commitments, renewable energy adoption, greenhouse gas (GHG) intensity, electric mobility, water stewardship, workforce diversity and governance against key financial ratios covering leverage, liquidity and capital structure. The findings show a consistent decline in GHG intensity, a rise in renewable energy share to 45 percent, sustained leadership in India's electric-vehicle market, and a reduction in the Debt-to-Equity ratio from 2.39 to 0.51 over the period. While the descriptive design of the study does not permit causal inference, the temporal alignment between ESG deepening and financial deleveraging is consistent with the wider empirical literature. The study argues that ESG at Tata Motors has moved from a compliance obligation to a strategic asset, and situates this transition within the broader ethical case for climate action in heavy industry.*

Keywords: *Automobile Industry, Climate Ethics, Corporate Governance, Electric Mobility, ESG, Financial Performance, India, Sustainability, Tata Motors*

I. INTRODUCTION

Corporate performance was, for most of the twentieth century, assessed almost entirely through profit and return metrics. Over the past two decades this view has broadened considerably. Investors, regulators and civil society now also ask how a company's operations affect the climate, how it treats its workforce and communities, and how transparently and accountably

it is governed. This broader lens is captured by the ESG framework Environmental, Social and Governance which has moved from a peripheral reporting exercise to a variable that credit rating agencies, institutional investors and regulators treat as materially relevant to firm value.

Financial ratios describe how a company has performed; they say comparatively little about the risks that may disrupt performance in future climate related supply chain shocks, regulatory penalties for high emissions, reputational damage from poor labour practices, or governance failures that erode investor trust. ESG indicators are, in effect, a forward-looking complement to backward-looking financial statements. In India, this logic has been formalized by the Securities and Exchange Board of India (SEBI), whose Business Responsibility and Sustainability Reporting (BRSR) framework, introduced in FY 2021-22, mandates structured ESG disclosure by the top 1,000 listed companies by market capitalization.

The automobile sector occupies a particularly sensitive position in this discussion. It is a significant contributor to global carbon emissions transport accounts for roughly one sixth of global CO₂ emissions and a heavy consumer of water, steel and rare earth materials. At the same time, it is central to the low carbon transition through electrification, and companies that move early on clean technology are, on the evidence reviewed in Section 3, better placed to avoid regulatory and reputational risk while

Capturing new demand. This tension between the automobile industry as a source of the climate problem and as a vehicle for its solution frames the present study.

Tata Motors Limited, part of the Tata Group founded by Jamsetji Tata in 1868 and incorporated in 1945, is used here as the empirical setting. Tata Motors is India's largest commercial vehicle manufacturer and, on a consolidated basis, includes Jaguar Land Rover (JLR) acquired from Ford Motor Company in 2008 which contributes the majority of group revenue. The company is also the dominant player in India's electric passenger-vehicle market. This combination of scale, an emissions intensive legacy business, and an accelerating clean mobility strategy makes it a useful case for examining how ESG and financial performance intersect in practice.

1.1 Objectives

(i) To examine the evolution of Tata Motors' ESG practices across seven material dimensions between FY 2020-21 and FY 2024-25; (ii) to assess the company's financial performance over the same period using key ratios drawn from consolidated audited statements; (iii) to explore the association between the two; and (iv) to situate the findings within the ethical case for climate action in heavy industry, and within comparative benchmarks against Indian and global automotive peers.

1.2 Scope and Limitations

The study covers Tata Motors on a consolidated basis, including JLR, across five fiscal years (April 2020 to March 2025). It relies entirely on secondary data annual reports, sustainability reports, BRSR filings and financial databases (Screener.in, Bloomberg)—and does not independently verify company reported ESG metrics. The associative approach used here identifies temporal alignment between ESG and financial trends; it does not establish causation, which would require panel regression or difference-in-difference methods beyond the scope of this article. Segment-level financial data (India operations versus JLR) is not separately available in all years, which limits the granularity of the financial analysis.

II. ESG, CLIMATE ETHICS AND THE AUTOMOBILE INDUSTRY

Beyond its financial-materiality case, ESG carries an ethical dimension that is worth stating explicitly, particularly for a sector that is both a major emitter and a major employer. Climate change raises questions of

intergenerational equity: emissions generated today by manufacturing and vehicle use impose costs on people, including future generations, who had no part in creating them. A firm's climate strategy is therefore not only a risk management exercise but also a statement about how it distributes the costs of its activity across time and across stakeholders who cannot bargain for themselves in today's markets.

A second ethical strand is climate justice within the transition itself. The shift away from internal combustion manufacturing affects supply-chain workers, component manufacturers and communities built around legacy plants, often unevenly. A 'just transition' lens asks whether a company's decarbonization path also protects the livelihoods of workers whose skills are tied to the technology being phased out, and whether the benefits of new clean-mobility jobs are distributed broadly rather than narrowly. Tata Motors' Future Skills Programme, discussed in Section 4, is one instance of a company attempting to manage this dimension, by re-training its existing workforce for electric and digital manufacturing rather than treating the transition purely as a technology substitution.

A third strand concerns disclosure integrity. Because most ESG data is self-reported, a company's ethical commitment is partly reflected in whether it seeks independent verification of its claims. Tata Motors' use of Science Based Targets initiative (SBTi) validation for its climate targets is relevant here: it subjects the company's Net Zero pathway to external, methodologically standardized scrutiny rather than leaving climate claims solely to internal reporting. These ethical considerations do not sit apart from the financial case explored later in this article; they reinforce it. Regulators and long-duration investors increasingly price in exactly these considerations fair transition, verified climate claims, intergenerational cost when assessing a company's cost of capital. The remainder of this article treats ESG as simultaneously a financial and an ethical variable, without assuming the two always point in the same direction.

III. REVIEW OF LITERATURE

The relationship between ESG (or its earlier equivalent, corporate social performance) and

financial performance has been studied for over three decades. The most comprehensive synthesis remains Frieze, Busch and Basset (2015), whose meta-analysis of more than 2,200 empirical studies found that roughly 90 percent reported a non negative ESG financial performance relationship, with the association strengthening over longer time horizons and when accounting-based rather than market-based measures were used suggesting that ESG value accrues gradually. Clark, Fainter and Viehs (2015) reached a similar conclusion via a review of over 200 studies, finding that sustainability practices are associated with a lower cost of capital and stronger operational performance. A more cautious note comes from Margolis, Enfeebling and Walsh (2007), whose meta analysis of 167 studies found a positive but small average effect, moderated heavily by industry context and the type of ESG activity examined an argument for company and sector specific studies such as this one.

Materiality is central to more recent work. Khan, Serafeim and Yoon (2016) showed that firms investing in ESG issues that are financially material to their specific industry, as defined by the Sustainability Accounting Standards Board (SASB), significantly outperformed peers, while investment in immaterial ESG issues showed no such effect. For automobile manufacturers, material issues include GHG emissions, fuel economy, supply-chain labour practices and product safety precisely the dimensions tracked in Section 4 of this study. Orlitzky, Schmidt and Rynes (2003) further found that reputation effects partially mediate the ESG–financial relationship, a mechanism relevant to Tata Motors given its brand positioning in both the Indian EV market and the global premium-vehicle segment occupied by JLR.

Emerging-market and Indian evidence adds an important qualification: governance quality appears to carry disproportionate weight relative to environmental and social factors in developing economies with less mature institutional frameworks (Vargas Hernandez & Noruzi, 2020). Within India specifically, Bose, Bhattacharyya and Bhatt (2017) found that firms with more granular ESG disclosure reported higher return on equity and lower borrowing costs, consistent with an information-asymmetry-reduction mechanism. Sector-specific studies

reinforce the pattern: Johnstone and Hascic (2011) found automotive firms that invested proactively in clean technology ahead of tightening emissions regulation outperformed reactive peers, consistent with the Porter Hypothesis that well-designed regulation can spur competitiveness-enhancing innovation; Cohen and Nath (2019) found that automakers with credible EV and ESG commitments attracted more patient institutional capital and secured lower credit spreads; and Amebic and Lanier (2008) identified five channels through which environmental investment pays off lower energy costs, reduced compliance costs, access to green-procurement markets, lower environmental liability risk, and reputational benefit all of which recur in the Tata Motors evidence below.

Governance-specific research provides the theoretical anchor for the financial deleveraging examined in Section 5. Gompers, Ishii and Metrick (2003) and Core, Holthausen and Larcker (1999) both found that stronger governance structures are associated with higher firm value, better capital allocation discipline and improved access to capital mechanisms consistent with a company that is simultaneously strengthening board oversight and reducing leverage. On the social dimension, Edmans (2011) found that employee satisfaction is associated with higher long-run stock returns, and Turban and Greening (1997) found that strong corporate social performance improves employer attractiveness both relevant to a company competing for scarce electric mobility engineering talent.

Taken together, the literature is broadly though not universally supportive of a positive ESG financial performance association, with the relationship strongest where ESG investment is industry-material, governance anchored, and sustained over a multi year horizon. Focused, longitudinal, single-company studies of Indian automotive manufacturers across the recent COVID-19 recovery and EV boom period remain scarce; this study is intended as a contribution to that gap.

IV. RESEARCH METHODOLOGY

This is a descriptive-analytical study based entirely on secondary data. ESG evidence is drawn from Tata

Motors' annual reports, integrated sustainability reports and BRSR filings (available from FY 2021-22); JLR sustainability reports; and SBTi validation records. Financial data is drawn from consolidated audited financial statements, cross checked against BSE/NSE disclosures and Screener.in. Seven ESG dimensions were selected for their materiality to the automobile sector under SASB and GRI frameworks: Net Zero commitments, renewable energy adoption, GHG emission intensity, electric mobility, water stewardship, workforce diversity, and governance

structure. Financial performance is assessed using standard ratios covering liquidity, leverage and capital structure (Table 1), selected because they are the ratios most directly linked in the literature to governance quality and cost of capital effects. The analysis uses comparative year-on-year trend analysis rather than statistical inference; consistent with the study's limitations (Section 1.2), findings are presented as associations rather than causal claims.

Table 1. Financial Ratios Used in This Study

Ratio	Formula	What It Captures
Return on Equity	Net Profit / Shareholders' Equity	Profitability
Current Ratio	Current Assets / Current Liabilities	Short-term liquidity
Debt-to-Equity Ratio	Total Borrowings / Total Equity	Leverage
Equity Ratio	Total Equity / Total Assets	Balance-sheet strength
Debt Ratio	Total Liabilities / Total Assets	Reliance on external financing

V. ESG PERFORMANCE OF TATA MOTORS, FY 2020-21 TO FY 2024-25

Table 2. ESG Comparative Summary, Tata Motors (FY21–FY25)

Indicator	FY21	FY22	FY23	FY24	FY25
Net Zero target	JLR 2039 announced	SBTi-validated plans	PV 2040 / CV 2045 committed	Project Aalingana formalised	Group Net Zero 2045 on track
Renewable energy share	20.0%	19.4%	25.9%	40% (India ops)	45% (India ops)

Indicator	FY21	FY22	FY23	FY24	FY25
GHG intensity (tCO ₂ e/vehicle)	0.69	0.49	0.359	0.296	0.305*
Domestic EV market share	65–71%	87%	~84%	73.1%	Sustained leadership
E-buses deployed (cumulative)	~350	645+	MoUs for 45,000+ EVs	2,600+	Continued scale-up
Water stewardship	Conservation & harvesting	Recycling begun at 2 plants	2 plants certified WN/WP	3 plants certified	Group 2030 water-neutrality target

Female workforce share	5.48%	6.53%	7.64%	11.10%	~10.0% (combined)
Governance	Ethics named material topic	Board SHS Committee formed	Future Skills Programme launched	Board-level ESG oversight	Risk Committee integrated

*FY25 GHG figure is provisional, pending final BRSR assurance.

5.1 Climate Commitments and Emission Reduction

Tata Motors' Net Zero architecture began with JLR's 2021 commitment to carbon neutrality by 2039 under its 'Reimagine' strategy, independently reviewed against the 1.5°C Paris Agreement pathway by SBTi in FY22. By FY23, Tata Motors India had formally committed its passenger-vehicle business to Net Zero by 2040 and its commercial-vehicle business by 2045, and FY24 saw these commitments consolidated into the 'Project Aalingana' governance framework. GHG intensity fell from 0.69 to 0.296 tones of CO₂-equivalent per vehicle between FY21 and FY24 a 57 percent reduction before a marginal uptick to 0.305 in FY25, attributable to a shift in production mix rather than any reversal in environmental management. This reduction reflects three converging factors: rising renewable-energy share (which cuts Scope 2 emissions), manufacturing efficiency upgrades (LED conversion, compressed-air optimization, furnace upgrades), and the growing share of EVs within the production mix.

5.2 Renewable Energy

Installed renewable capacity grew from 13 MW in FY21 when JLR's UK, Slovakia and Brazil facilities already ran on 100 percent renewable electricity to 78 MW by FY25, including India's largest grid-connected solar carport at the Pune facility (6.2 MWp, commissioned FY22). At a typical Indian solar capacity utilization factor of approximately 20 percent, 78 MW generates roughly 137 million kWh annually; at an average industrial tariff of INR 7.50/kWh, this implies annual energy cost avoidance in the order of INR 100 crore, alongside reduced exposure to electricity tariff volatility.

5.3 Electric Mobility

Electric mobility is the clearest point of overlap between ESG performance and commercial outcome. EV volumes grew 353 percent between FY21 and

FY22, driven principally by the Nexon EV, and domestic EV market share stayed above 70 percent for most of the study period. In the commercial segment, e-bus deployment under government FAME-II contracts scaled from roughly 350 units in FY21 to over 2,600 by FY24, backed by MoUs for a further 45,000-plus EVs signed in FY23—a policy-linked, relatively low-credit-risk revenue stream.

5.4 Water Stewardship, Diversity and Governance

Water management progressed from basic conservation in FY21 to independently certified status: the Pantnagar plant achieved Water Neutral and Lucknow Water Positive certification (Confederation of Indian Industry) in FY23, with Dharwad added in FY24, ahead of a group-wide 2030 water-neutrality target. Female workforce representation more than doubled, from 5.48 percent in FY21 to over 11 percent in FY24, supported by dedicated all women assembly lines at Pune and Sanand and the FY23 Future Skills Programme, though the ratio still trails the global automotive average of roughly 20–22 percent. On governance, oversight moved from identifying ethics as a material topic (FY21) to a dedicated board-level Safety, Health and Sustainability Committee (FY22), formal board ESG oversight (FY24) and integration of ESG into the Risk Committee's mandate (FY25).

VI. FINANCIAL PERFORMANCE, FY 2020-21 TO FY 2024-25

This section reports the five financial ratios most relevant to the governance-and-leverage thread of the analysis. A full consolidated balance sheet is not reproduced here: for an article-length piece the underlying line items add length without adding interpretive value beyond what the ratios already convey, and detailed balance-sheet extracts sit more naturally in a full-length report or its appendix than in a publication-format article. Readers seeking the

complete balance sheet should refer to Tata Motors' published consolidated financial statements.

Table 3. Key Financial Ratios, Tata Motors Consolidated (FY21–FY25)

Ratio	FY21	FY22	FY23	FY24	FY25
Current ratio	0.93	0.98	0.98	0.97	0.96
Debt-to-Equity ratio	2.39	2.86	2.39	1.06	0.51
Total liabilities to equity	5.04	5.77	5.39	2.98	2.08
Equity ratio	0.17	0.15	0.16	0.25	0.32
Debt ratio	0.83	0.85	0.84	0.75	0.68

The dominant pattern is deleveraging. The Debt-to-Equity ratio rose from 2.39 in FY21 to a peak of 2.86 in FY22 reflecting the lingering effect of pandemic-era borrowing before falling sharply to 0.51 by FY25, a decline driven substantially by cash generation from JLR's recovery. The equity ratio nearly doubled, from 0.17 to 0.32, and the debt ratio fell from 0.83 to 0.68, indicating a materially stronger balance sheet and reduced reliance on external financing. The current ratio, by contrast, moved only marginally (0.93 to 0.96) and remained below 1.0 throughout, which signals that short-term liquidity management, unlike leverage, was not a primary focus of the company's financial strategy over this period and remains an area to monitor.

VII. ESG–FINANCIAL PERFORMANCE: ASSOCIATION ANALYSIS

Four linkages stand out when the ESG and financial trends are read side by side. First, EV leadership tracks revenue recovery and mix improvement: sustained dominant market share in the fastest-growing vehicle segment, combined with e-bus contracts that provide policy-backed, long-duration revenue, plausibly supported the top-line recovery that funded deleveraging. Second, the renewable energy

programme estimated INR 100-crore annual cost avoidance is a direct, quantifiable contributor to margin, independent of any reputational effect. Third, governance strengthening board level ESG oversight, SBTi validation, integration of ESG into risk management coincides precisely with the period of sharpest deleveraging (Debt-to-Equity: 2.39x to 0.51x), a pattern consistent with the governance literature reviewed in Section 3, which links stronger governance to improved investor confidence and lower cost of capital. Fourth, GHG intensity reduction has a direct regulatory-risk dimension for JLR specifically, given the EU's fleet-average CO2 regulation (95 g/km, introduced 2021) and its tightening

Trajectory toward zero-emission mandates by 2035; sustained emission reduction lowers Tata Motors' exposure to penalty risk in its largest revenue market. These linkages are associative, not causal: JLR's post-pandemic recovery, broader industry cyclicity and macroeconomic conditions (interest rates, currency movements) all plausibly contributed to the financial trends independently of ESG activity, and disentangling these effects would require the panel-based methods noted in Section 1.2 as outside this study's scope. What the data support is a consistent, multi-year temporal alignment between deepening ESG commitment and improving financial structure—a pattern that is, at minimum, not contradicted by the direction the literature predicts.

7.1 Peer Benchmarking (FY 2023-24)

Table 4. Selective ESG Peer Benchmarking, FY 2023-24 (peer figures approximate, from public disclosures)

Metric	Tata Motors	Maruti Suzuki	M&M	Toyota (Global)
Renewable energy share	40% (India ops)	~25%	~30%	~30%
Female workforce share	11.10%	~8%	~12%	~11%
Net Zero	2039 (JLR)	2070	2040	2050

target year	/ 2040–2045 (India)	(India)		
SBTi validated	Yes	No (as of FY24)	Yes	Yes

Tata Motors compares favourably with its principal Indian peers on renewable-energy share, the ambition of its Net Zero target and independent (SBTi) validation, though its female workforce ratio, while improved, sits within the general range of Indian sector averages rather than ahead of them.

VIII. FINDINGS

Finding 1. ESG practice at Tata Motors matured from largely aspirational, JLR-driven commitments in FY21 to an institutionalised, board-governed and independently validated framework by FY25.

Finding 2. Electric mobility is the clearest case of ESG and commercial strategy pointing in the same direction, combining emissions reduction with dominant market share in the industry's highest-growth segment.

Finding 3. GHG intensity fell 57 percent between FY21 and FY24, independently credible because the underlying targets carry SBTi validation rather than resting solely on self-reported claims.

Finding 4. Renewable energy investment (13 MW to 78 MW) generates a quantifiable, recurring cost benefit and reduces exposure to electricity-tariff volatility.

Finding 5. Governance strengthening coincides closely with the period of sharpest balance-sheet deleveraging, a pattern consistent with—though not proof of—the governance-financial performance link established in the literature.

Finding 6. Workforce diversity improved substantially (5.48 percent to over 11 percent) but remains below

global automotive benchmarks, leaving room for further progress.

Conclusion

Overall, the evidence indicates that ESG at Tata Motors has moved beyond a compliance obligation and become embedded in the company's strategic and financial trajectory over FY 2020-21 to FY 2024-25. The study does not claim to prove that ESG investment caused the observed financial improvement; JLR's cyclical recovery and broader macroeconomic conditions were also at work. What it does show is a consistent, multi-year alignment between deepening ESG commitment spanning climate targets, renewable energy, electric mobility, water stewardship, diversity and governance—and a materially stronger balance sheet, in a direction consistent with the wider empirical and ethical case for treating ESG as a driver of, rather than a cost to, long-term value.

8.1 Recommendations

Address Scope 3 emissions. Downstream vehicle-use emissions typically represent 70–80 percent of an automaker's lifecycle footprint; Tata Motors should extend SBTi-validated targets to Scope 3, engaging Tier 1/2 suppliers on their own decarbonisation pathways.

Deepen disclosure granularity. Segment-level (India operations versus JLR) ESG and financial reporting, aligned with GRI and TCFD, would improve external comparability and strengthen the credibility of aggregate claims.

Link executive compensation to ESG outcomes. Tying a defined share of senior-executive compensation to GHG, renewable-energy, EV-volume and diversity milestones would strengthen the governance–ESG connection identified in Section 7.

Scale diversity initiatives further. Sustained, targeted programme's expanded parental leave, return ship pathways and leadership-pipeline mentoring are needed to close the remaining gap to global benchmarks.

Use green and sustainability-linked finance. SBTi validation positions Tata Motors well to issue green bonds or sustainability-linked bonds, potentially

lowering the cost of capital for ESG-aligned capital expenditure while adding an external accountability mechanism.

Invest in battery circularity. As the first generation of Tata EVs approaches end-of-battery-life, second-life storage applications and recycling infrastructure—building on the FY24 TATVA Circularity initiative will mitigate future environmental liability and may open new revenue streams.

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