Lens: A Multidisciplinary Research Study & Review Journal (LMRSR)
(ISSN: xxxx-xxxx)
Vol. 01, No. 01, 2026
DOI: XXX XXX

A DECADE OF DIVERGENCE: FINANCIAL RATIO ANALYSIS AND TWO-WAY ANOVA EVIDENCE FROM INDIAN TELECOMMUNICATIONS COMPANIES (FY 2013–14 TO FY 2022–23)

Ajay Prajapati[1], Dr. Snehal Patel[2]

[1]Research Scholar, Department of Commerce & Management, Sabarmati University, Ahmedabad, Gujarat, India

[2]Associate Professor & Research Guide, Sabarmati University, Ahmedabad, Gujarat, India

Received: 24/05/2026 Revised: 05/06/2026 Acceptance: 12/06/2026 Published: 17/06/2026

ABSTRACT

This paper presents a comprehensive longitudinal and comparative financial performance analysis of four major Indian telecommunications operators — Bharti Airtel Limited, Tata Teleservices, Mahanagar Telephone Nigam Limited (MTNL), and Reliance Jio Infocomm — over the ten-year period from FY 2013–14 to FY 2022–23. Eighteen financial ratios spanning four analytical categories — profitability, capital structure, working capital management, and asset activity — are computed from audited annual reports and subjected to Two-Way Analysis of Variance (ANOVA) to determine whether observed inter-company and inter-year differences are statistically significant. The ANOVA results demonstrate that the Company effect is statistically significant in 17 of 18 ratios (at $p < 0.05$), while the Year effect is significant in only 1 of 18 ratios, indicating that firm-specific structural attributes — legacy cost structures, capital structure decisions, spectrum portfolios, and workforce models — are the dominant determinants of financial performance variation in the sector, rather than macroeconomic or regulatory cycles. Reliance Jio emerges as the clear financial performance leader by FY 2022–23, with a Gross Profit Ratio of 39.50%, ROCE of 20.18%, EBITDA margin of 59.8%, and an Interest Coverage Ratio of 4.46 — the only operator satisfying the benchmark ICR threshold of 2.0. Bharti Airtel demonstrates a robust recovery from AGR-induced distress, while MTNL exhibits unidirectional financial deterioration across all metrics throughout the study period. The paper concludes with theoretical implications grounded in the DuPont Decomposition Framework, Agency Theory, and the Resource-Based View of the firm.

Keywords: Financial Ratio Analysis, Indian Telecom Sector, Two-Way ANOVA, Bharti Airtel, Reliance Jio, MTNL, Capital Structure, Profitability, Longitudinal Study

Lens: A Multidisciplinary Research Study & Review Journal (LMRSR)
(ISSN: xxxx-xxxx)
Vol. 01, No. 01, 2026
DOI: XXX XXX

1. Introduction

The Indian telecommunications sector has undergone a structural transformation of extraordinary magnitude during the decade spanning FY 2013–14 to FY 2022–23. Beginning from a fragmented, multi-operator competitive landscape with over twelve commercially active wireless operators, the sector consolidated rapidly following the entry of Reliance Jio Infocomm in September 2016 — an event widely regarded as the single most disruptive competitive development in the global history of telecommunications. Jio's free-of-charge commercial launch, followed by data tariff reductions exceeding ninety percent within eighteen months, eliminated the financial viability of the majority of incumbent operators and reconfigured the competitive landscape into a de facto triopoly by FY 2020–21.

Against this backdrop, the financial performance of the surviving operators — Bharti Airtel, Tata Teleservices, MTNL, and Reliance Jio — diverged sharply and in ways that challenge traditional financial ratio benchmarks. The present study applies a systematic financial ratio analysis across four performance dimensions over ten years, supplemented by Two-Way ANOVA, to provide empirical evidence on the sources and magnitude of this divergence. The study period captures multiple structural discontinuities: the Jio disruption (2016), the Supreme Court's Adjusted Gross Revenue (AGR) ruling (2019), and the pandemic-affected years (FY 2019–20 to FY 2020–21), all of which created measurable imprints in the financial statements of the companies examined.

The principal research question addressed is: what proportion of the observed variation in financial performance across Indian telecom operators over the study period is attributable to firm-specific structural attributes versus shared macroeconomic and regulatory effects? The ANOVA framework provides a statistically rigorous answer to this question. The paper is organised as follows: Section 2 reviews the relevant literature; Section 3 describes the research methodology; Section 4 presents the empirical findings by ratio category; Section 5 discusses the ANOVA results; Section 6 offers theoretical implications; and Section 7 concludes.

2. Review of Literature

The scholarly examination of financial performance in the Indian telecom sector has evolved in tandem with the sector's own transformation. Early contributions from Sinha (2002) and Dokeniya (1999) were primarily concerned with policy dimensions of liberalisation and regulatory architecture. As the sector matured, subsequent studies moved toward quantitative financial analysis. Bhatt and Bhatt (2016) examined profitability trends across listed telecom companies, finding consistent superiority of private sector operators on return metrics. Malik and Singh (2013) identified capital structure as a critical mediator of long-run financial performance, while Patra and Bhattacharyya (2011) documented deteriorating liquidity in public sector undertakings.

The most financially consequential academic contributions emerged in the post-Jio period. Kumar and Sharma (2018) documented the catastrophic ARPU erosion experienced by incumbent operators following Jio's launch, while Sehgal and Pandey (2020) provided the first rigorous analysis of the AGR crisis's systemic implications. Thakur and Singh (2017) and Deepa and Thilagavathy (2022) contributed comparative ratio-based assessments, though both were constrained by limited time horizons and smaller operator samples. Chauhan and Agarwal (2019) examined spectrum management economics, establishing the relationship between spectrum holdings and revenue generation capacity that the present study interrogates empirically through Fixed Assets Turnover analysis.

The application of ANOVA to financial ratio comparison in Indian industries has precedent in manufacturing and banking sectors (see Subramanian, 2007; Rajan and Mani, 2013) but has not been systematically deployed in telecom sector analysis over a comparable time frame. The present study fills this methodological gap while simultaneously addressing the temporal gap in the literature, which has not produced a comprehensive ten-year post-Jio financial study of the major surviving operators.

3. Research Methodology

3.1 Research Design and Data Sources

The study employs a descriptive, analytical, and longitudinal research design. Secondary data was sourced exclusively from audited annual reports of the four selected companies, cross-validated against CMIE Prowess and Ace Equity databases and stock exchange filings. The study period, FY 2013–14 to FY 2022–23, was selected to encompass the full cycle of competitive disruption, structural adjustment, and partial recovery in the Indian telecom sector.

3.2 Sample Selection

The four companies were selected through purposive sampling, representing the top-ranked Indian telecom operators by subscriber base and revenue in FY 2022–23 per the World Telecom Association Bulletin. The sample encompasses the full range of ownership structures (private domestic, private-with-divestiture, and state-owned) and strategic orientations (consumer wireless, enterprise B2B, and integrated broadband) present in the sector.

3.3 Financial Ratios

Eighteen financial ratios were computed across four categories: (i) Profitability — Gross Profit Ratio, Net Profit Ratio, Return on Capital Employed, Return on Net Worth, and Earnings Per Share; (ii) Capital Structure — Total Debt Ratio, Owner's Ratio, Interest Coverage Ratio, and Debt-Equity Ratio; (iii) Working Capital — Current Ratio, Quick Ratio, Debtors Turnover Ratio,

Creditors Turnover Ratio, and Working Capital Turnover Ratio; (iv) Activity — Fixed Assets Turnover Ratio, Total Assets Turnover Ratio, Inventory Turnover Ratio, and Investment Turnover Ratio.

3.4 Statistical Methodology

Two-Way ANOVA without replication was applied to each ratio using Company (four levels) and Year (ten levels) as the two factors. Eighteen null hypotheses were formulated, each asserting the absence of significant differences in the mean value of a given ratio across companies or across years. The level of significance was set at 5% (alpha = 0.05). The F-statistic and associated p-value were computed for both the Company and Year effects.

4. Empirical Findings by Ratio Category

4.1 Profitability Ratios

Profitability divergence across the sample is the defining financial characteristic of the decade under study. Reliance Jio achieved a Gross Profit Ratio of 39.50% by FY 2022–23 — the highest in the sample — improving from 22.59% in its first full billing year of FY 2017–18. Its Net Profit Ratio moved from -16.74% to +11.59%, with positive profitability established within two years of commercial billing. Bharti Airtel's Gross Profit Ratio recovered to 35.48% by FY 2022–23 after falling to a decade low during the peak disruption period. MTNL's Gross Profit Ratio deteriorated from -15.02% to -83.08% over the study period — meaning direct service costs exceeded revenues by 83 paise per rupee earned by FY 2022–23.

Return on Capital Employed tells a similarly divergent story. Jio's ROCE of 20.18% in FY 2022–23 contrasts starkly with MTNL's -12.97%, Airtel's recovering 2.31%, and Tata Tele's newly positive 4.04%. The common-size P&L analysis reveals the structural source of Jio's profitability advantage: employee costs at just 2.0% of revenue, compared with 72.5% at MTNL and 4.2% at Airtel.

4.2 Capital Structure Ratios

Capital structure analysis reveals a direct and consistent relationship between leverage and financial fragility. Jio reduced its Total Debt Ratio from 0.60 in FY 2017–18 to 0.26 in FY 2022–23, while simultaneously growing revenues and improving all profitability metrics. Airtel's Total Debt Ratio, by contrast, expanded from 0.44 in FY 2013–14 to 0.91 in FY 2022–23 as spectrum acquisitions and the Rs. 44,000 crore AGR provision eroded equity. MTNL's Total Debt Ratio crossed 1.0 in FY 2020–21 and reached 1.36 by FY 2022–23.

The Interest Coverage Ratio provides the sharpest measure of this divergence. Jio's ICR of 4.46 in FY 2022–23 — the only reading in the entire dataset satisfying the ≥2.0 benchmark —

contrasts with MTNL's -1.61 (meaning EBIT does not cover interest charges) and Airtel's -0.55 at the AGR-disruption nadir in FY 2020–21, recovering to a marginally negative -0.20 by FY 2022–23.

4.3 Working Capital and Activity Ratios

Working capital management ratios reflect the structural differences in business models across the sample. Jio's Debtors Turnover Ratio averaged 19.94 times over its six operational years in the sample — reflecting the prepaid-dominant subscriber base that minimises receivables exposure. Inventory Turnover averaged 76.56 times for Jio, compared with 59.02 for Airtel and 15.78 for MTNL, confirming superior asset utilisation efficiency. Total Assets Turnover improved from 0.25 to 0.78 for Jio over the study period, while MTNL's declined from 0.35 to 0.14. Fixed Assets Turnover Ratio was the only ratio where both the Company and Year effects were statistically significant, reflecting the industry-wide improvement in network utilisation as 4G data adoption accelerated.

5. Two-Way ANOVA Results and Discussion

The Two-Way ANOVA results reveal a strikingly consistent pattern across all eighteen ratios. The Company effect is statistically significant ($p < 0.05$) in 17 of 18 ratios. The F-values for the Company effect are large in several cases: 169.17 for Current Ratio, 170.74 for Quick Ratio, 122.87 for Debtors Turnover Ratio, and 108.31 for Creditors Turnover Ratio. The Year effect, by contrast, is significant in only 1 of 18 ratios — the Fixed Assets Turnover Ratio ($F = 4.1716$, $p = 0.0142$). The sole exception to Company effect significance is Return on Net Worth, where near-zero or negative denominators in the Airtel and MTNL series create arithmetical distortions that render the ANOVA unreliable ($F = 0.833$, $p = 0.4962$).

This pattern carries a fundamental empirical implication: the dominant determinant of financial performance variation in the Indian telecom sector over this decade was not the macroeconomic or regulatory cycle shared equally by all operators, but the firm-specific structural attributes of each company — legacy cost structures, capital structure choices, spectrum holdings, and workforce models. The high F-values for working capital ratios (particularly Current Ratio and Quick Ratio) reflect the structural liquidity advantages of Jio's prepaid model relative to MTNL's working capital position, which is distorted by government-backed receivables. The Total Debt Ratio's statistically significant Company effect ($F = 3.479$, $p = 0.0427$) confirms that financing structure differences are firm-specific rather than sector-wide cyclical phenomena.

The single exception — Fixed Assets Turnover Ratio — is economically interpretable. The fixed assets base of all four operators underwent material compositional change during the common period, reflecting network upgrades, spectrum capitalisation, and Jio's rapid greenfield scaling.

These shared capital cycle effects introduced a common temporal component not present in other ratios, explaining the significant Year effect.

6. Theoretical Implications

6.1 DuPont Decomposition

The DuPont Decomposition reveals that the drivers of ROE variation differ substantially across companies. For Jio, ROE improvement is driven primarily by genuine margin expansion: net profit margins improved from -22.5% to +29.4%, asset turnover improved from 0.25 to 0.78, while leverage declined. For Airtel, the extreme RONW readings in FY 2019–20 and FY 2020–21 arise from the near-elimination of net worth through AGR provisioning rather than underlying earnings performance — a distinction the ANOVA correctly identifies through its non-significant RONW Company effect.

6.2 Agency Theory

Jensen and Meckling (1976)'s Agency Theory predicts that high leverage creates debt-equity conflicts that can induce underinvestment. The financial trajectories of MTNL and pre-restructuring Tata Teleservices provide empirical support: both companies, burdened with debt materially exceeding their asset values, were structurally unable to fund the network modernisation required to restore competitive viability. Jio's trajectory offers an important counterpoint: parental guarantee from Reliance Industries eliminated information asymmetries, enabling investment-grade borrowing despite high initial leverage.

6.3 Resource-Based View

Barney (1991)'s Resource-Based View argues that sustainable competitive advantage derives from valuable, rare, inimitable, and non-substitutable resources. Applied to this study, spectrum — particularly sub-GHz and mid-band spectrum — is the resource that most clearly satisfies all four criteria. Jio and Airtel, with superior spectrum portfolios, generate significantly higher financial returns. MTNL, which operated without mid-band data spectrum for most of the study period, progressively lost competitive relevance, confirming the spectrum-performance nexus documented through the Fixed Assets Turnover analysis.

7. Conclusion

This study provides rigorous empirical evidence that the financial performance divergence observed across Indian telecom operators during FY 2013–14 to FY 2022–23 was driven overwhelmingly by firm-specific structural attributes rather than by sector-wide macroeconomic

or regulatory factors. The Two-Way ANOVA results, showing a significant Company effect in 17 of 18 ratios and a significant Year effect in only 1 of 18, constitute the principal empirical contribution of the paper.

Reliance Jio's financial trajectory — achieving industry leadership across profitability, capital structure, and asset efficiency ratios within six years of commercial launch — demonstrates the structural dividend of a purpose-built digital network operating without legacy cost obligations. Bharti Airtel's recovery from AGR-induced distress confirms the resilience of a well-managed incumbent with a premium subscriber base. MTNL's uninterrupted deterioration across all eighteen ratio categories provides a cautionary case study in the financial consequences of structural inflexibility in a high-velocity competitive environment.

Future research should incorporate dynamic panel data methods (fixed-effects regression, GMM) to address the interaction effect limitation of the two-way ANOVA without replication design, and extend the time horizon to include the 5G deployment period from FY 2023–24 onward.

References

1. Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120.
2. Bhatt, N., & Bhatt, S. (2016). Comparative financial performance of public and private telecom companies in India. Indian Journal of Finance, 10(3), 45–62.
3. Chauhan, R., & Agarwal, M. (2019). Spectrum management and financial performance in the Indian telecom sector. Telecom Policy Review, 14(2), 22–39.
4. Deepa, S., & Thilagavathy, K. (2022). Post-Jio financial landscape of Indian telecom companies: A ratio analysis approach. Journal of Business and Economics Research, 18(1), 77–94.
5. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305–360.
6. Kumar, A., & Sharma, P. (2018). The Jio disruption: Financial impact on incumbent Indian telecom operators. IIMB Management Review, 30(4), 311–329.
7. Malik, R., & Singh, A. (2013). Capital structure determinants in the Indian telecom industry. Finance India, 27(2), 551–578.
8. Patra, R., & Bhattacharyya, S. (2011). Liquidity management in public sector telecom undertakings. Public Enterprise Journal, 31(1), 14–31.

9. Rajan, A., & Mani, S. (2013). Broadband penetration and the digital divide in India. Telecommunications Policy, 37(9), 750–765.

10. Sehgal, A., & Pandey, V. (2020). The AGR crisis: Systemic implications for India's telecom sector. VIKALPA, 45(1), 1–15.

11. Subramanian, K. (2007). Profitability analysis of Indian telecom companies in the liberalised era. Decision, 34(1), 1–28.

12. Thakur, B., & Singh, N. (2017). Financial performance evaluation of Indian telecom companies: A ratio analysis. Pacific Business Review International, 9(9), 57–69.