



A Study on Profitability Analysis of the Indian Telecom Sector

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Abstract—

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The Indian telecom sector entered a consolidation phase after 2019, marked by intense price competition, tariff hikes, heavy spectrum obligations and rapid data growth, all of which have reshaped operators' profitability profiles. This study analyses the profitability of key Indian telecom operators over the five-year period 2019-20 to 2023-24 using secondary data from standalone balance sheets and income statements of major service providers. Profitability is evaluated through ratios such as Return on Assets (ROA), Return on Equity (ROE), Net Profit Margin, Operating Margin and Return on Capital Employed (ROCE). The study adopts a descriptive and analytical approach, applying ratio analysis and simple trend analysis to examine inter-firm and inter-temporal differences. Recent empirical work generally finds that Bharti Airtel has emerged as the strongest performer in terms of profitability and asset efficiency, while Vodafone Idea and BSNL continue to face persistent losses and financial stress despite some improvement in revenues and ARPU at the sector level. The present paper contributes by focusing specifically on 2019-20 to 2023-24, a period when tariff hikes and data-led growth began to restore sector revenue, and by grounding profitability analysis in standalone financial statements of leading operators.

Keywords— Profitability, Return on Equity, Return on Capital employed, Profit after Tax



1. Introduction

The telecom sector is a critical enabler of India's digital economy, supporting e-governance, fintech, e-commerce and social inclusion. After the disruptive entry of Reliance Jio and the AGR-related regulatory shocks, the period from 2019-20 onwards saw the industry move from extreme price wars towards a more disciplined, oligopolistic structure dominated by Jio, Bharti Airtel, Vodafone Idea and the public sector operator BSNL. Sector-level data from the Telecom Regulatory Authority of India and industry analyses show that industry gross revenue and ARPU almost doubled between 2019 and 2024, driven by multiple rounds of tariff hikes and growth in data usage.

Despite this revenue recovery, the distribution of profitability across operators has remained highly uneven. Comparative financial-performance studies indicate that Bharti Airtel's ROA and ROCE have improved and turned positive in recent years, whereas Vodafone Idea and BSNL continue to report losses and suffer from weak asset utilisation and high leverage. Given the sector's importance and the policy emphasis on sustainable competition, a focused profitability analysis of major operators over 2019-20 to 2023-24, using consistent standalone financial statements, is both academically and practically relevant.

2. Review of literature

2.1 Pandey, Verma and Jain (2013) undertook a comparative financial assessment of four Indian telecom operators, drawing on a wide set of financial ratios spanning efficiency, leverage, liquidity, profitability, solvency, and Altman Z-score measures. Their F-test based analysis documented meaningful cross-firm differences in current ratios, debt-equity ratios, asset turnover, and return on equity, pointing to the heterogeneous financial structures and risk profiles that characterize the Indian telecom sector.

2.2 Velnampy and Kajanathan (2013) examined the relationship between cash position and profitability for two listed Sri Lankan telecom firms over 2005–2011. Using ROA and ROE as profitability indicators alongside several liquidity ratios, they found a significant relationship between cash position and earnings performance in Sri Lanka Telecom but no such relationship in Dialog Telecom, highlighting that liquidity-profitability dynamics can be distinctly firm-specific even within the same national market.

2.3 Mahato and Jagannathan (2015) investigated how working capital management shapes profitability across eight NSE-listed Indian telecom firms over 2010–2015. Using OLS regression with ROA as the dependent variable and variables such as collection period, inventory conversion, cash conversion cycle, and current ratio as predictors, they found ROA to be negatively associated with most working capital measures, suggesting that leaner working capital management tends to support better earnings performance in this sector.

2.4 Ananda Kumar and Subramanian (2015) assessed the profitability of Whirlpool India against selected peers using gross profit, operating margin, and net profit measures supported by ANOVA and descriptive statistics. Their conclusion — that sustained profitability depends fundamentally on cost discipline and efficient resource deployment — provides a useful cross-sector methodological benchmark for ratio-based profitability studies.

2.5 Busu (2015) applied Altman's Z-score framework to Romanian mobile telecom operators over 2009–2013. His firm-level computations for Orange, Cosmote, Vodafone, and RCS & RDS revealed that the first two maintained consistently low bankruptcy risk throughout, while the latter remained in higher-risk classification zones — demonstrating the practical utility of Z-score analysis as a complement to traditional ratio-based approaches.

2.6 Sharma and Kaur (2016) studied Bharti Airtel's working capital performance over 2007–08 to 2014–15 and found that while most operational ratios performed satisfactorily, liquidity indicators were above optimal levels. They documented a significant negative relationship between liquidity and profitability, indicating that excess liquidity imposes an opportunity cost on earnings — a finding relevant to interpreting working capital decisions in capital-intensive telecom operations.

2.7 Khan and Safiuddin (2016) compared Bharti Airtel and Vodafone India on liquidity and profitability measures for 2010–2016. Their analysis found Vodafone to be more liquid and simultaneously more profitable than Airtel during the period, reinforcing the view that carefully managed liquidity policies can coexist with — and even support — superior returns to shareholders and assets.



2.8 Kulkarni (2016), writing in the context of chemical and allied industries, argued that high returns are typically associated with reduced inventory holdings and lower operating expenditure rather than with maximized liquidity buffers. This conceptual contribution underlines the importance of optimising rather than simply maximizing liquidity — a principle equally applicable when interpreting telecom sector working capital and profitability relationships.

2.9 Barot and Japee (2021) examined Bharti Airtel and Vodafone Idea over 2015–16 to 2019–20, using profitability margins, current ratio, debt-equity ratio, and interest coverage as analytical tools. Their findings documented persistent net losses for Airtel post-2016–17, rising leverage, and a deteriorating current ratio for Vodafone Idea — collectively illustrating the severity of the financial stress both operators faced in the immediate post-Jio competitive environment.

2.10 Meghanathi and Chakrawal (2021) analyzed five large Indian oil and gas companies from 2016–17 to 2020–21 using liquidity and profitability ratios alongside ANOVA testing. Their finding that Reliance Industries outperformed peers on both dimensions simultaneously provides useful cross-sector evidence that robust liquidity management and high profitability are not mutually exclusive outcomes when operational efficiency is genuinely strong.

3. Research gap and significance

While several studies examine telecom profitability and financial performance, many either (a) focus on periods ending in 2018 -19, (b) cover only a subset of operators or (c) analyse mixed samples of telecom and non-telecom firms. Recent work that does cover 2018-19 to 2022-23 tends to focus on only two private operators (Airtel and Vodafone Idea) and often uses a limited set of profitability ratios without explicitly specifying standalone versus consolidated financials. There is limited systematic work that:

- ❖ Concentrates on the post-tariff-hike recovery phase (2019-20 to 2023-24);
- ❖ Uses a consistent standalone-financials framework for all operators; and

This paper attempts to address the limitations observed in earlier research by concentrating on the most recent period from **2019-20 to 2023-24**. It relies on the standalone financial statements, particularly the balance sheets and income statements, of the major telecom operators in India. Using these financial records, the study undertakes a systematic evaluation of profitability through the application of widely accepted financial ratios and an examination of their trends over the selected period. This approach enables a clearer understanding of the financial performance and profitability patterns of telecom companies in the contemporary market environment.

4. Objectives of the study

The study is designed to achieve the following objectives:

4. Objectives of the Study

The study pursues the following specific objectives:

- 4.1 To examine the profitability position of major Indian telecom operators over the period 2019-20 to 2023-
- 4.2 To analyse year-wise and firm-wise trends in key profitability ratios -Net Profit Margin, Return on Assets, Return on Equity, Return on Capital Employed, and Operating Profit Margin.
- 4.3 To compare profitability performance across operators and identify which firms demonstrate improving, stable, or deteriorating financial trajectories during the study period

5. Hypotheses

The following null hypotheses are tested:

H₀5.1: There is no significant difference in Net Profit Margin among the selected telecom operators during the study period.



H₀5.2: There is no significant difference in Return on Assets among the selected telecom operators during the study period.

H₀5.3: There is no significant difference in Return on Equity among the selected telecom operators during the study period.

H₀5.4: There is no significant difference in Return on Capital Employed among the selected telecom operators during the study period.

H₀5.5: The mean Operating Profit Margin of the selected telecom operators is equal during the study period.

6. Research Methodology

6.1 Data and sample

The study is based entirely on secondary data drawn from the audited standalone financial statements balance sheets and income statements of selected Indian telecom companies for the five financial years 2019-20 to 2023-24. Standalone statements are used to capture the core domestic telecom operations of each entity without the effects of subsidiaries or foreign businesses, in line with previous ratio-analysis studies.

The sample includes BSNL (public sector), Bharti Airtel and Vodafone Idea (VI) as primary firms.

6.2 Time of study

The period 2019-20 to 2023-24 is chosen because it captures:

- The phase after the peak of price wars,
- The implementation of multiple rounds of tariff hikes, and
- The early impact of 4G saturation and 5G initiation on revenues and profitability.

6.3 Tools and ratios

From the standalone financial statements, the following key items are extracted:

- Total operating revenue / net sales
- Profit after tax (PAT)
- Total assets (or average total assets)
- Shareholders' equity / net worth (or average equity)
- Capital employed (equity + long-term debt)

Based on these, the study computes standard profitability ratios:

- Net Profit Margin = $PAT \div Net\ Sales$
- Operating Margin = $Operating\ Profit \div Net\ Sales$
- Return on Assets (ROA) = $Profit\ after\ tax \div Total\ Assets$
- Return on Equity (ROE) = $Profit\ after\ tax \div Shareholders'\ Equity$
- Return on Capital Employed (ROCE) = $Earning\ before\ interest\ and\ tax \div Capital\ Employed$

The analytical approach is descriptive and comparative - firm-wise and year-wise ratios are tabulated, trends are examined through line charts, and mean and standard deviation are used to summaries profitability levels and variability across the study period. Where inter-firm differences warrant formal testing, one-way ANOVA has been applied to test the stated hypotheses at the 5% level of significance.



Limitations of the Study: The study is bounded by several methodological constraints. The sample covers four telecom operators and may not represent the full breadth of the industry. All data is drawn from published standalone financial statements, and the five-year study window, while analytically focused, may not fully capture longer-term cyclical trends. The analysis is confined to selected profitability ratios and does not account for external macroeconomic variables or qualitative strategic factors that may influence financial performance.

7. Data Analysis

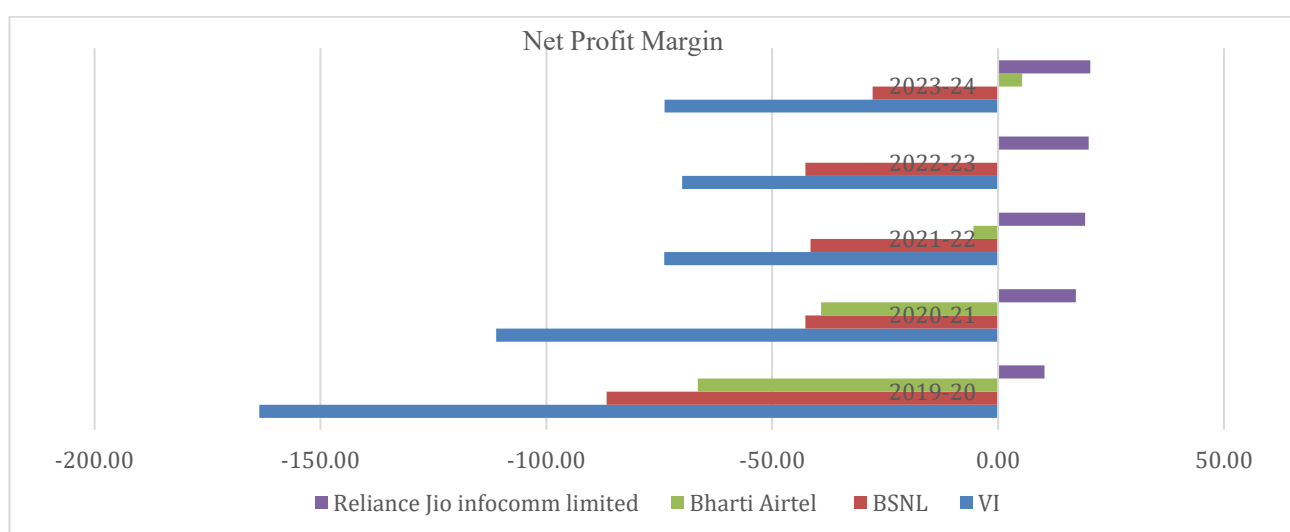
7.1 Net Profit Margin: The Net Profit Margin, measured as profit after tax divided by net sales, captures what proportion of each rupee earned from operations ultimately survives after accounting for all costs, taxes, interest, and depreciation charges. It is perhaps the most direct single measure of a firm's bottom-line profitability and reflects the combined outcome of revenue generation, cost management, and financial structure.

Table 7.1.1. Net Profit Ratio in Selected Telecom Companies
All figures in Percentage

Year	VI	BSNL	Bharti Airtel	Reliance Jio infocomm limited
2019-20	-163.55	-86.66	-66.44	10.24
2020-21	-111.09	-42.64	-39.17	17.19
2021-22	-73.88	-41.53	-5.46	19.25
2022-23	-69.92	-42.67	-0.11	20.05
2023-24	-73.81	-27.78	5.30	20.44
Mean	-98.45	-48.26	-21.18	17.44
SD	40.07	22.37	30.68	4.21

Source: Annual financial statement of the companies and compiled using excel.

Chart 7.1.1. Net Profit Ratio in Selected Telecom Companies under Study



The Net Profit Margin Ratio presented in Table 7.1.1 reveals significant differences in profitability among the selected telecom companies during the period 2019 -20 to 2023-24. Vodafone Idea Limited (VI) consistently recorded the poorest performance with highly negative profit margins throughout the study period. Its margin improved from -163.55 percent in 2019 -20 to -69.92 percent in 2022 -23 but slightly deteriorated to -73.81 percent in 2023 -24. The mean value of -98.45 percent with a high standard deviation (40.07) indicates persistent losses and considerable variability in its profitability. BSNL also reported negative profit margins in all the years, though its losses were comparatively lower



than VI. BSNL's margin improved gradually from -86.66 percent in 2019 -20 to -27.78 percent in 2023 -24, with a mean of -48.26 percent, reflecting moderate improvement but continued financial stress. Bharti Airtel Limited showed a remarkable recovery. The company reduced its losses steadily from -66.44 percent in 2019 -20 to near break-even in 2022 -23 (-0.11 percent) and eventually achieved a positive margin of 5.30 percent in 2023 -24. Meanwhile, Reliance Jio Infocomm Limited maintained strong profitability throughout the period, with margins increasing from 10.24 percent to 20.44 percent and a stable mean of 17.44

7.1.1 Hypothesis Testing

Anova: Single Factor

Table 7.1.2

SUMMARY

Groups	Count	Sum	Average	Variance
VI	5	-492.24	-98.45	1605.70
BSNL	5	-241.28	-48.26	500.43
Bharti Airtel	5	-105.88	-21.18	941.16
Reliance Jio infocomm limited	5	87.18	17.44	17.75

7.1.3. Table ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	35574.10	3	11858.03	15.48	0.00005	3.24
Within Groups	12260.18	16	766.26			
Total	47834.28	19				

As per table 7.1.3 the ANOVA test yields an F-statistic of 15.48 against a critical value of 3.24, with a p-value of 0.00005, decisively rejecting the null hypothesis and confirming that the differences in net profit margins across the four operators are statistically significant rather than incidental.

7.2.1 Return on Assets (ROA): Return on Assets measures how effectively a company converts its total asset base into net earnings. In a capital-intensive industry like telecom where operators carry enormous investments in spectrum, fibre, towers, and network equipment. ROA is particularly meaningful because it reveals whether those large asset bases are generating commensurate returns or simply sitting as unproductive capital.

Table 7.2.1. Return on Assets Ratio in Selected Telecom Companies

From 2019-20 to 2023-24

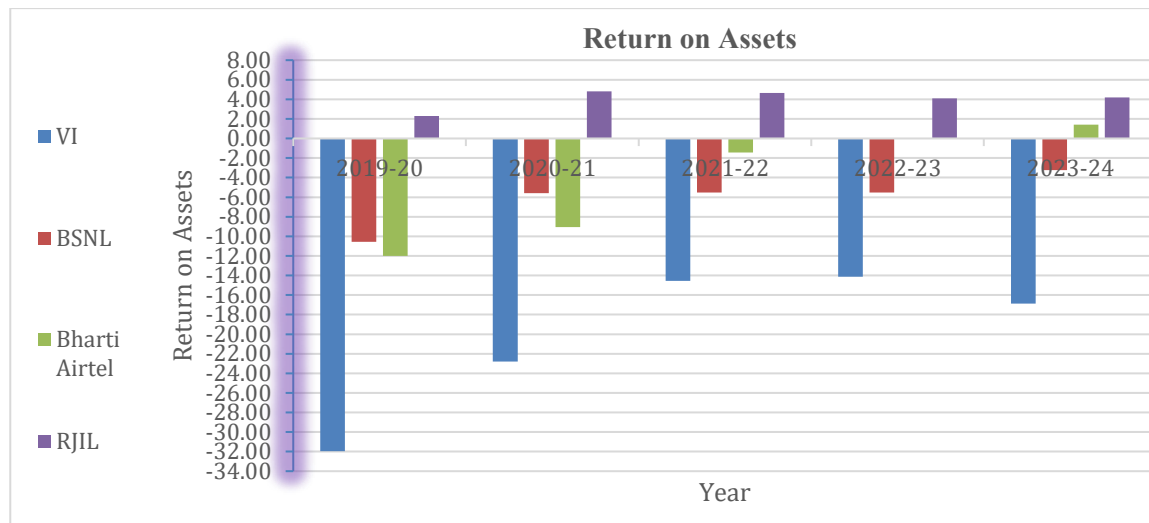
All Figures in Percentage

Year	VI	BSNL	Bharti Airtel	RJIL
2019-20	-31.95	-10.56	-12.01	2.30
2020-21	-22.79	-5.60	-9.07	4.80
2021-22	-14.56	-5.52	-1.42	4.65
2022-23	-14.14	-5.54	-0.03	4.08
2023-24	-16.88	-3.23	1.42	4.20
Mean	-20.07	-6.09	-4.22	4.01
SD	7.49	2.69	5.95	1.00

Source: Annual financial statement of the companies and compiled using excel.



**Chart 7.2.1. Net Profit Margin Ratio in Selected Telecom Companies under Study
From 2019-20 to 2023-24**



RJIL again leads the group, maintaining positive ROA in every year of the study rising from 2.30% in 2019–20 to 4.20% in 2023–24, with a mean of 4.01% and a minimal standard deviation of 1.00. This combination of consistent positivity and low variability signals not just adequate returns but genuinely stable and efficient asset deployment.

Bharti Airtel's ROA trajectory mirrors its net profit improvement: from -12.01% in 2019-20, the ratio climbed steadily through the negative range, crossing into positive territory at 1.42% in 2023-24. A mean of -4.22% reflects the transitional nature of the period, but the direction of travel is unambiguous.

BSNL recorded negative ROA across all five years, though the magnitude of loss declined from -10.56% to -3.23% by 2023-24. Its standard deviation of 2.69 suggests a relatively stable, if persistently negative, performance study consistent with an operator that is losing money but doing so at a gradually declining rate.

Vodafone Idea sits at the bottom of this ranking with a mean ROA of -20.07% and a standard deviation of 7.49 the highest variability in the group reflecting ongoing and substantial asset underutilization relative to the scale of losses being incurred.

7.2.2 Hypothesis Testing

Anova: Single Factor

Table 7.2.2. - Summary

SUMMARY

Groups	Count	Sum	Average	Variance
VI	5	-100.33	-20.07	56.06
BSNL	5	-30.45	-6.09	7.26
Bharti Airtel	5	-21.12	-4.22	35.37
RJIL	5	20.04	4.01	1.00



Table 7.2.3. -ANOVA

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1498.74	3.00	499.58	20.05	0.00001	3.24
Within Groups	398.76	16.00	24.92			
Total	1897.51	19.00				

The ANOVA result ($F = 20.05$, $p = 0.00001$) rejects the null hypothesis, confirming statistically significant differences in asset utilization efficiency across the four operators.

7.3.1 Return on Equity: Return on Equity tells how much profit a company earns for each shareholder. It is particularly sensitive to the equity base — and therein lies an important analytical nuance for this dataset. Vodafone Idea's equity base turned negative during the study period due to accumulated losses, rendering ROE mathematically unreliable and analytically meaningless for that firm. Its exclusion from the ROE analysis is therefore not an omission but a methodologically sound decision that reflects the severity of its financial condition.

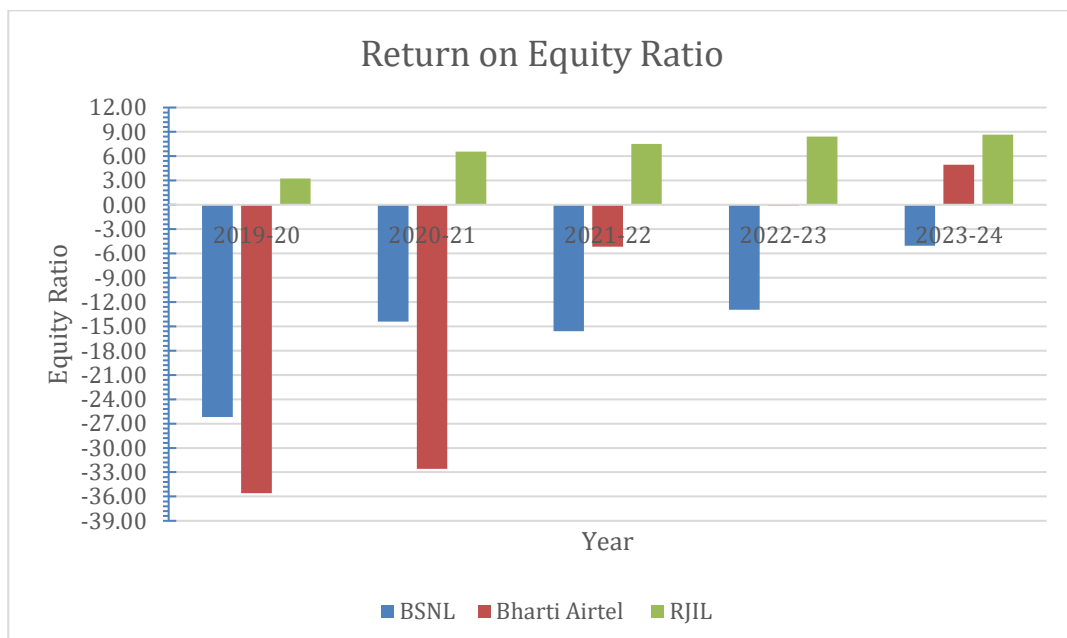
Table 7.3.1. Return on Equity Ratio in Selected Telecom Companies

All Figures in Percentage

Year	VI	BSNL	Bharti Airtel	RJIL
2019-20	Excluded due to negative equity base	-26.21	-35.58	3.25
2020-21		-14.40	-32.57	6.57
2021-22		-15.62	-5.16	7.49
2022-23		-12.96	-0.11	8.43
2023-24		-5.04	4.95	8.66
Mean		-14.84	-13.70	6.88
SD		7.58	18.97	2.19

Source: Annual financial statement of the companies and compiled using excel.

Chart 7.3.1. Net Profit Margin Ratio in Selected Telecom Companies under Study





The table 7.3.1 shows Among the three remaining operators, RJIL once again demonstrates the strongest and most consistent performance. Its ROE grew steadily from 3.25% in 2019-20 to 8.66% in 2023-24, with a mean of 6.88% and the tightest standard deviation of 2.19 in the group. This reflects not just profitable operations but an equity base that is being deployed with increasing effectiveness over time.

Bharti Airtel's ROE moved from a deeply negative -35.58% in 2019-20 to a positive 4.95% by 2023-24 a remarkable swing that speaks to the scale of the financial transformation the company achieved during this period. The high standard deviation of 18.97 captures the extent of this journey rather than ongoing instability.

BSNL remained in negative ROE territory throughout, moving from -26.21% to -5.04% across the five years. Its mean of -14.84% reflects sustained losses on shareholders' capital, though the improvement in recent years parallels the broader recovery driven by government support measures.

7.3.2 Hypothesis Testing

Anova: Single Factor

Table 7.3.2. - Summary

Groups	Count	Sum	Average	Variance
BSNL	5	-74.22	-14.84	57.41
Bharti Airtel	5	-68.48	-13.70	360.01
RJIL	5	34.40	6.88	4.80

Table 7.3.3. -ANOVA

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1494.3684	2	747.18	5.31	0.02	3.89
Within Groups	1688.8695	12	140.74			
Total	3183.2379	14				

Table 7.3.3 shows ANOVA result ($F = 5.31$, $p = 0.02$) rejects the null hypothesis, confirming significant inter-firm differences in equity returns. The statistical significance here is somewhat less pronounced than in other ratios, reflecting both the smaller group size following VI's exclusion and the wide within-group variance introduced by Airtel's dramatic trajectory.

7.4.1 Return on Capital Employed (ROCE): ROCE, computed as EBIT divided by capital employed, offers a capital-structure-neutral view of operational efficiency. Unlike ROE, this is not distorted by high leverage, making it a specifically useful measure for comparing firms with very different debt profiles which is precisely the situation across the four operators studied here



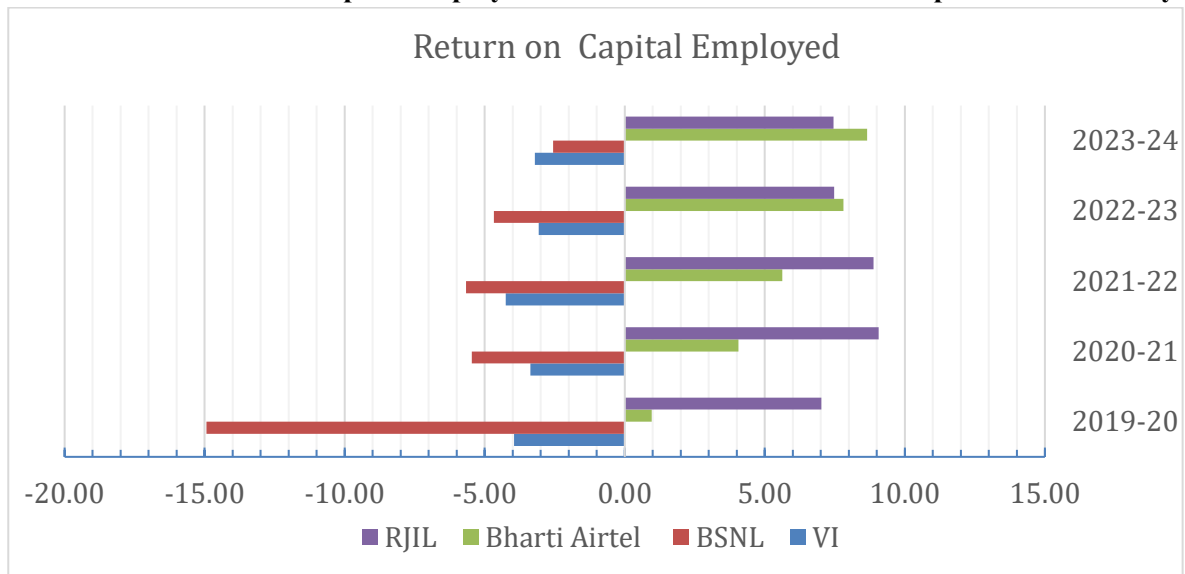
Table 7.4.1. Return on Capital Employed Ratio in Selected Telecom Companies

All Figures in Percentage

Year	VI	BSNL	Bharti Airtel	RJIL
2019-20	-3.95	-14.93	0.96	7.01
2020-21	-3.38	-5.46	4.06	9.06
2021-22	-4.25	-5.67	5.63	8.88
2022-23	-3.07	-4.67	7.80	7.47
2023-24	-3.21	-2.56	8.65	7.45
Mean	-3.57	-6.66	5.42	7.98
SD	0.50	4.78	3.08	0.93

Source: Annual financial statement of the companies and compiled using excel.

Chart 7.4.1. Return on Capital Employed Ratio in Selected Telecom Companies under Study



The data presented in Table 7.4.1 shows RJIL leads on this measure as well, with a mean ROCE of 7.98% and a SD of just 0.93, the most stable performance in the group across all five profitability ratios. Its ROCE moved from 7.01% in 2019-20 to 7.45% in 2023-24, reflecting the operational consistency of a company that has successfully converted its capital investments into reliable earnings.

Airtel's ROCE grew impressively from a marginal 0.96% in 2019–20 to 8.65% in 2023–24, with a mean of 5.42%. The trend suggests that capital invested in network upgrades and spectrum is generating progressively stronger operating returns, a hallmark of a well-executing operator entering a phase of operational maturity.

Vodafone Idea recorded negative ROCE in every year, but within a relatively narrow and stable band of -3.07% to -4.25%, with a mean of -3.57% and a low standard deviation of 0.50. This consistency paradoxically is not reassuring; it reflects an operator locked in a steady state of capital inefficiency with limited signs of operational breakthrough.

BSNL showed the widest improvement on this measure, moving from -14.93% in 2019-20 to -2.56% in 2023-24. While still negative, the trajectory is meaningfully positive, reflecting improved operational cost management under the government's restructuring programme.



7.4.2 Hypothesis Testing

Anova: Single Factor

Table 7.4.2. - Summary

Groups	Count	Sum	Average	Variance
VI	5	-17.86	-3.57	0.25
BSNL	5	-33.30	-6.66	22.89
Bharti				
Airtel	5	27.10	5.42	9.48
RJIL	5	39.89	7.98	0.86

Table 7.4.3. -ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	738.05	3	246.02	29.38	0.000001	3.24
Within Groups	133.96	16	8.37			
Total	872.01	19				

Table 7.4.3 indicates ANOVA result ($F = 29.38$, $p = 0.000001$) provides the strongest statistical evidence of inter-firm differences among all the profitability ratios tested, decisively rejecting the null hypothesis.

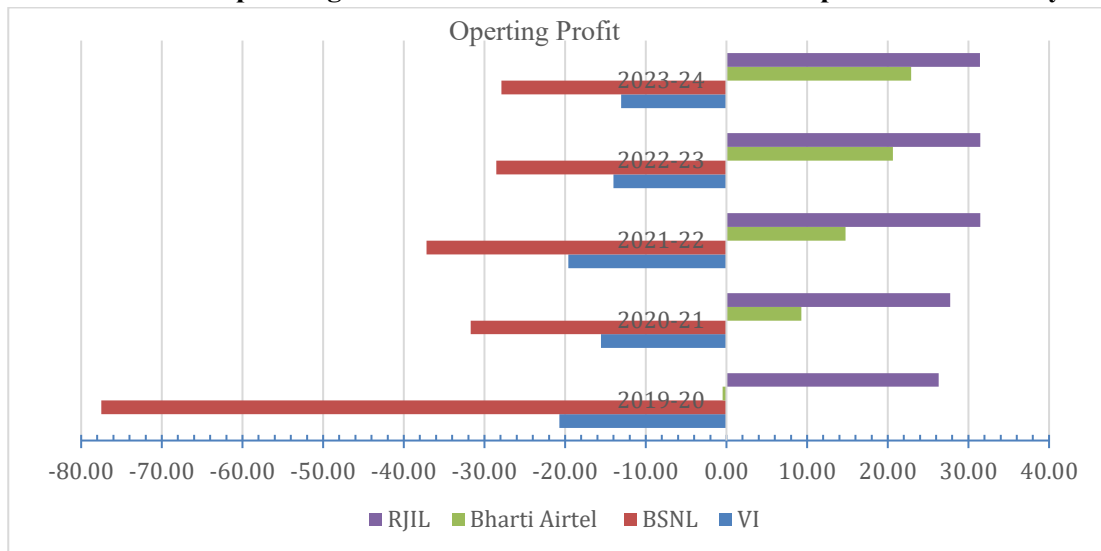
7.5.1 Operating Profit: The Operating Profit Margin captures how efficiently a company manages its core operational costs before the impact of financing decisions and tax obligations. For telecom operators carrying large interest burdens, this ratio is particularly instructive because it isolates operational performance from the financial structure overlay.

Table 7.5.1. Operating Profit Ratio in Selected Telecom Companies

All Figures in Percentage

Year	VI	BSNL	Bharti Airtel	RJIL
2019-20	-20.73	-77.49	-0.48	26.30
2020-21	-15.54	-31.69	9.31	27.75
2021-22	-19.59	-37.19	14.75	31.47
2022-23	-14.01	-28.51	20.63	31.49
2023-24	-13.04	-27.90	22.92	31.45
Mean	-16.58	-40.56	13.42	29.69
SD	3.41	20.97	9.41	2.49

Source: Annual financial statement of the companies and compiled using excel.

**Chart 7.5.1. Operating Profit Ratio in Selected Telecom Companies under Study**

The data presented in Table 7.5.1 illustrates the operating profit ratios of the selected telecom companies for the period from 2019 -20 to 2023 -24. RJIL again leads the sector, maintaining consistently high operating margins throughout ranging from 26.30% in 2019-20 to 31.45% in 2023–24, with a mean of 29.69% and a tight standard deviation of 2.49. This stability in operating margins, achieved while growing at scale, reflects the structural cost advantages of a greenfield network built on modern technology with no legacy infrastructure burden.

Airtel's operating margin trajectory is the most impressive transformation in the dataset. Moving from near-zero at -0.48% in 2019-20, the ratio climbed to 22.92% by 2023–24, a swing of over 23 percentage points in five years. This improvement is a direct reflection of tariff-driven revenue growth outpacing cost inflation, combined with the efficiencies gained from network rationalisation.

Vodafone Idea's operating margin remained negative throughout, narrowing from -20.73% to -13.04% over the period. The mean of -16.58% and a modest standard deviation of 3.41 indicate that VI is losing less on each rupee of revenue than before, but has yet to bring operations above the breakeven line at the operating level, a prerequisite for any sustainable financial recovery.

BSNL recorded the most severe operating losses, with a mean of -40.56%, though the improvement from -77.49% in 2019-20 to -27.90% in 2023-24 is notable. The high standard deviation of 20.97 reflects the significant year-to-year fluctuations in cost absorption and revenue recognition that characterise a public sector operator undergoing structural transformation.

7.5.2 Hypothesis Testing

Anova: Single Factor

Table 7.5.2. - Summary

Groups	Count	Sum	Average	Variance
VI	5	-82.91	-16.58	11.63
BSNL	5	-202.78	-40.56	439.80
Bharti Airtel	5	67.12	13.42	88.47
RJIL	5	148.45	29.69	6.20

**Table 7.5.3. -ANOVA**

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	14662.06	3.00	4887.35	35.80	0.0000003	3.24
Within Groups	2184.43	16.00	136.53			
Total	16846.48	19.00				

Table 7.5.3 shows ANOVA result ($F = 35.80$, $p = 0.0000003$) is the most statistically emphatic of all the ratios tested, rejecting the null hypothesis with an extremely high degree of confidence and confirming that differences in operating efficiency across the four firms are structural, substantial, and enduring.

8. Findings of the Study

8.1 Across all five profitability ratios examined, RJIL consistently emerged as the strongest performer, recording positive and improving figures on every measure throughout the study period. It indicates values for Net Profit (17.44%), ROA (4.01%), ROE (6.88%), ROCE (7.98%), and Operating Profit Margin (29.69%) collectively establish it as the most financially healthy and operationally efficient operator in the Indian telecom sector during 2019-20 to 2023-24.

8.2 Bharti Airtel demonstrated the most significant financial transformation across the study period. Starting from substantial losses on nearly every measure in 2019-20, the company progressively improved across all five ratios, crossing into positive territory on Net Profit Margin, ROA, and ROE by 2023-24, while its ROCE and Operating Profit Margin reached their strongest recorded levels. This turnaround reflects the delayed but materialising payoff from strategic network investments and the favourable impact of tariff revision cycles.

8.3 Vodafone Idea recorded the weakest profitability performance across every measure and every year of the study period. Negative values across all five ratios, a negative equity base that renders ROE analytically redundant, and only marginal improvement in most indicators collectively point to an operator in a state of prolonged financial distress. The absence of any year in which VI achieved positive profitability on any measure is a finding that carries serious implications for its long-term viability as a going concern.

8.4 BSNL showed a gradual but government-dependent recovery across all measures. While its profitability ratios remained negative throughout, the consistent directional improvement particularly in ROCE, Operating Profit Margin, and Net Profit Margin suggests that the state-backed revival measures have had a measurable operational impact.

8.5 The ANOVA results uniformly reject the null hypothesis of no significant difference across all five profitability ratios -Net Profit Margin ($F = 15.48$, $p = 0.00005$), ROA ($F = 20.05$, $p = 0.00001$), ROE ($F = 5.31$, $p = 0.02$), ROCE ($F = 29.38$, $p = 0.000001$), and Operating Profit Margin ($F = 35.80$, $p = 0.0000003$). In every case, the calculated F-value exceeds the critical threshold at the 5% level of significance, and the p-values are well below 0.05, confirming that the profitability differences observed across operators are statistically robust, systematic, and not attributable to random variation.

8.6 A clear and consistent profitability hierarchy emerges across all five ratios: RJIL occupies the strongest position, followed by Bharti Airtel on an improving trajectory, with BSNL in a state of assisted recovery and Vodafone Idea in persistent and unresolved financial distress. This hierarchy is not specific to any single measure, it holds across every profitability dimension examined, lending it considerable analytical credibility and thesis-level significance.

Conclusion: The five-year period from 2019–20 to 2023–24 was one of considerable transformation for the Indian telecom sector, but a transformation that lead out differently across companies. Sector-wide revenue recovery, driven by tariff hikes and data growth, created a broadly improving external environment. Yet the ability to translate that environment into actual profitability improvement proved to be deeply firm-specific, shaped by each operator's capital structure, cost efficiency, market positioning, and access to capital.



Reliance Jio Infocomm Limited emerged from this period as an operator that had not merely survived the competitive disruption it initiated but had built, in a remarkably short time, a financially robust and increasingly profitable business. Bharti Airtel's story is one of perseverance and strategic discipline, a company that absorbed years of financial pressure and gradually earned its way back to profitability through sustained operational improvement. BSNL's trajectory, while encouraging in direction, remains contingent on state support, and its path to genuine financial independence is unclear. Vodafone Idea, despite operating in the same improved sector environment, ended the study period with negative profitability across every single measure, a condition that raises basic questions about its future as a viable, independent commercial operator.

Together, these findings point to a sector that is not converging toward a common financial model but rather diverging with market forces, policy interventions, and strategic choices producing outcomes that are as different from one another as the companies themselves. Understanding these differences, and the structural factors that drive them, is essential for any comprehensive assessment of India's telecom industry at this pivotal moment in its development.

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