A Study on Financial Distress of Selected Communication Companies in India

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Abstract

The Indian communication industry has experienced significant growth and transformation in recent years, driven by technological advancements, increased mobile penetration, and the adoption of digital services. However, this rapid expansion has also led to intense competition, mounting debt, and regulatory challenges, which have put several communication companies in India under financial distress. This paper aims to provide a comprehensive analysis of the financial distress faced by communication companies in India, its underlying causes, and the potential implications on the industry's overall stability. This research employs a mixed-method approach, incorporating both qualitative and quantitative analyses. The qualitative segment entails a detailed examination of financial reports, market trends, and regulatory policies, shedding light on the key factors contributing to financial distress. On the quantitative front, this study utilizes financial ratios, liquidity indicators, profitability measures, and solvency metrics to assess the Altman's Z-Score for financial health of selected communication companies. By comparing the financial performance of distressed firms with their healthier counterparts, this research aims to identify key financial markers that indicate the onset of distress. The findings reveal that communication companies in India are grappling with a myriad of issues, including high debt levels, intensified price wars, capital-intensive infrastructure investments, and regulatory uncertainties.

Keywords: Financial distress, accounting ratios, descriptive statistics, Altman's Z-score, ANOVA

1. Introduction

Financial distress refers to a situation in which a company or individual faces significant difficulties in meeting their financial obligations or sustaining their operations due to an inability to generate sufficient cash flow or access necessary funding. It is a critical stage in the financial health of an entity and can have severe consequences if not addressed promptly and effectively. For businesses, financial distress can arise from various factors such as: When a company's sales or revenues decrease over time, it may struggle to cover its operating expenses and debt payments. Companies with substantial debt burdens may find it challenging to make interest and principal payments, leading to a downward spiral of increasing debt and financial strain. Inadequate financial management, inefficient operations, or strategic errors can lead to financial instability. During economic downturns or recessions, businesses may experience reduced consumer spending, lower demand for products or services, and increased competition, all of which can contribute to financial distress. Technological advancements, changes in consumer preferences, or shifts in industry regulations can negatively impact companies, leading to financial difficulties. Even profitable companies can face financial distress if they encounter cash flow problems, such as delayed payments from customers or difficulties in collecting accounts receivable. Signs of financial distress in a business may include increasing debt, declining profits, liquidity issues, missed loan payments, layoffs, and asset sales to raise cash. For individuals, financial distress can stem from similar issues, such as high levels of debt, job loss, medical emergencies, or inadequate financial planning. It is crucial to address financial distress promptly to avoid bankruptcy or insolvency. Potential solutions include cost-cutting measures, debt restructuring, seeking new sources of funding, improving operational efficiency, and seeking professional financial advice. It is essential to note that financial distress can be a natural part of the business or economic cycle, but identifying it early and taking appropriate action can often help mitigate the impact and lead to a path of recovery.

2. Methodology

The main objective of this research is to evaluate financial distress of selected communication companies of India. Thus, the descriptive part of the selected firm is examined and the nature of this research descriptive in design. To evaluate the company's financial health an application of Altman's Z-score is evaluated which is explain in detail for each of the company. The inferential

analysis supporting to examine the final comparison and conclusions. The latest financial reports of each company evaluated for financial year 2019 to 2023.

3. Application on Data

These applications play a crucial role in data analytics, helping businesses make informed decisions based on valuable insights. In the area of financial distress, data applications are instrumental in managing complex datasets and extracting meaningful patterns and trends.

3.1. Reliance Communication

Table 1: Parameters for Reliance Communication

	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19
Working Capital	10,365.00	8,960.00	20,105.00	14,444.00	19,004.00
Total Assets	40,295.00	44,500.00	44,786.00	45,217.00	62,082.00
Retained Earnings (Income-Div.)	340	349	483	818	1465
Operating Income	332	345	483	818	1,379.00
Market Capital	1,383.00	1,383.00	1,383.00	1,383.00	1,383.00
Total Liabilities	20557	26,053.00	15,061.00	20,769.00	17,672.00
Sales	332	345	483	818	1379

The company's financial data shows interesting trends over five consecutive periods. The working capital has varied, starting at a value of Rs.10,365 and ending at Rs.19,004. This indicates fluctuations in the company's liquidity, with a positive trend overall. Total assets have steadily increased from Rs.40,295 to Rs.62,082, indicating the company's growth and accumulation of resources. Retained earnings, representing the portion of net income reinvested into the business, have consistently risen over the periods, suggesting profitability and the company's commitment to reinvestment. Operating income has shown a gradual upward trend, starting at Rs.332 and reaching Rs.1,379, indicating an improvement in the company's profitability from core business operations. Market capitalization has remained constant at Rs.1,383 over the five periods, suggesting stability in the company's stock value.

Total liabilities have fluctuated, with values ranging from Rs.15,061 to Rs.26,053. This indicates varying levels of debt and financial obligations. Sales have steadily increased from Rs.332 to Rs.1,379, indicating the company's success in generating revenue from its business activities. Overall, the analysis shows positive developments in the company's financial performance, with improved liquidity, profitability, and revenue growth.

Table 2: Altman Z-Score for Reliance Communication

Original z-score model	Coefficient	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19	Variable (avg.)
X_1 = working capital ÷ total asset	1.20	0.257	0.201	0.449	0.319	0.306	0.307
X_2 = retained earnings ÷ total assets	1.40	0.008	0.008	0.011	0.018	0.024	0.014
X_3 = ebit ÷ total assets	3.30	0.008	0.008	0.011	0.018	0.022	0.013
X_4 = market capitalization ÷ total liabilities	0.60	0.07	0.05	0.09	0.07	0.08	0.07
X_5 = sales ÷ total assets	0.99	0.008	0.008	0.011	0.018	0.022	0.013
Altman z-score							0.42

The Altman Z-Score model is a widely recognized tool for assessing a company's financial stability and the likelihood of facing bankruptcy within the next two years. The Z-Score is calculated using five financial ratios, each assigned specific coefficients: working capital divided by total assets (X_1), retained earnings divided by total assets (X_2), EBIT (earnings before interest and taxes) divided by total assets (X_3), market capitalization divided by total liabilities (X_4), and sales divided by total assets (X_5). In the most recent year (Mar-23), the company's Altman Z-Score was calculated to be approximately 0.396. A Z-Score below 1.8 indicates a high risk of bankruptcy. Therefore, based on the Z-Score, the company's financial health appears to be fragile, and it may face significant challenges in meeting its financial obligations in the near future. It is important for the company's management and stakeholders to closely monitor its financial performance, liquidity, and debt levels to mitigate potential risks and improve its overall financial stability. Further analysis and proactive measures may be necessary to strengthen the company's financial position and reduce the possibility of bankruptcy.

The Altman Z-Score model, a widely-used bankruptcy prediction tool developed by Dr. Edward Altman, assesses a company's financial health and its likelihood of facing bankruptcy within the next two years. The Z-Score is computed using five financial ratios (X_1 to X_5), each assigned specific coefficients. These ratios are: X_1 = Working Capital ÷ Total Assets X_2 = Retained Earnings ÷ Total Assets X_3 = EBIT (Earnings Before Interest and Taxes) ÷ Total Assets X_4 = Market Capitalization ÷ Total Liabilities X_5 = Sales ÷ Total Assets The Z-Score formula is as follows: Z-Score = $1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.99X_5$ Now, let's calculate the Altman Z-Score for the company using the provided financial ratios for Mar-23: X_1 = 0.228 X_2 = 0.925 X_3 = 0.914. The calculated Altman Z-Score for the company using the provided financial ratios for Mar-23 is 7.88. A Z-Score above 2.99 is typically considered safe, indicating a low probability of bankruptcy. Therefore, with a Z-Score of 7.88, the company exhibits a robust financial position with a significantly reduced risk of facing financial distress or bankruptcy within the next two years.

The Altman Z-Score model's interpretation is as follows:

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- Z-Score > 2.99: Safe Zone-Suggests that the company is financially healthy, with a low risk of bankruptcy.
- 1.81 < Z-Score < 2.99: Gray Zone-Indicates that the company's financial condition is uncertain, and further analysis is required.
- Z-Score < 1.81: Distress Zone-Suggests that the company may be at a higher risk of bankruptcy.

In this case, the company's Z-Score of 7.88 falls well above the safe zone, indicating a strong financial position. The company's financial ratios, such as working capital, retained earnings, EBIT, market capitalization, and sales, are all in favourable positions compared to the industry benchmarks, contributing to the high Z-Score. While the Altman Z-Score is a valuable tool for assessing a company's financial health, it is essential to remember that it is not infallible and should be used in conjunction with other financial indicators and industry-specific considerations to form a comprehensive assessment of the company's financial condition. Continuous monitoring and analysis are crucial to ensure the company's ongoing financial stability and success.

3.2. Tata Telecommunication

Table 3: Parameters for Tata Telecommunication

	Mar-23	**Mar-22**	**Mar-21**	**Mar-20**	**Mar-19**
Working capital	275.93	411.90	870.80	820.29	1,545.72
Total assets	1,210.74	1,364.53	1,508.98	1,714.21	4,602.29
Retained earnings (income-div.)	1119.89	1105.26	1067.76	1112.26	1315.58
Operating income	1,106.17	1,093.80	1,043.66	1,077.74	1,277.20
Market capital	3,737.23	1,954.93	1,954.93	1,954.93	1,954.93
Total liabilities	934.81	952.63	638.18	893.92	3056.57
Sales	1093.8	1078.82	1023.98	1052.62	1246.4

The financial data provided offers valuable insights into the company's performance over five consecutive periods. Starting with working capital, we observe a consistent upward trend from 275.93 to 1,545.72. This indicates that the company has been successful in bolstering its short-term liquidity, equipping it to meet its current obligations more effectively. Concurrently, total assets have experienced significant growth, rising from 1,210.74 to 4,602.29. This substantial increase suggests that the company has been actively expanding its resource base, potentially through acquisitions or strategic investments. The retained earnings figures, ranging from 1,105.26 to 1,315.58, have remained relatively stable. This stability implies that the company has consistently retained a portion of its earnings for reinvestment or future use, which can contribute to its financial resilience. Furthermore, the consistent performance of operating income, fluctuating only slightly from 1,043.66 to 1,277.20, indicates that the company has been able to generate profits consistently from its core business operations. On the other hand, the market capitalization has shown an initial surge from 1,954.93 to 3,737.23, followed by stability at that level. This may indicate an optimistic perception of the company's value in the market or significant events that influenced the market capitalization. Lastly, the data on total liabilities indicates varying levels, with the highest at 3,056.57 and the lowest at 638.18. Careful management of liabilities is essential to maintain the company's financial health. In summary, the analysis reveals positive trends in working capital, total assets, retained earnings, and operating income, reflecting a robust financial performance. However, prudent monitoring of liabilities and continued efforts to sustain growth and profitability are crucial for the company's long-term success. Further examination and comparison with industry benchmarks would be beneficial for a comprehensive understanding of the company's financial standing.

Table 4: Altman Z-Score for Tata Telecommunication

Original z-score model	Coefficient	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19	Variable (avg.)
X_1 = working capital ÷ total asset	1.20	0.228	0.302	0.577	0.479	0.336	0.384
X_2 = retained earnings ÷ total assets	1.40	0.925	0.810	0.708	0.649	0.286	0.675
X_3 = ebit ÷ total assets	3.30	0.914	0.802	0.692	0.629	0.278	0.663
X_4 = market capitalization ÷ total liabilities	0.60	4.00	2.05	3.06	2.19	0.64	2.39
X_5 = sales ÷ total assets	0.99	0.903	0.791	0.679	0.614	0.271	0.651
Altman z-score							4.76

The Altman Z-Score model, created by Dr. Edward Altman, is a significant financial tool used to assess a company's vulnerability to bankruptcy within the next two years. This model utilizes five financial ratios (X1 to X5) with specific coefficients to determine the Z-Score. The five ratios are calculated as follows: X1 represents working capital divided by total assets, X2 is retained earnings divided by total assets, X3 is EBIT divided by total assets, X4 is market capitalization divided by total liabilities, and X5 is sales divided by total assets. By applying the appropriate coefficients to these ratios and summing the results, the Altman Z-Score is derived.

In the case of the company analysed using the provided financial ratios for Mar-23, the calculated Z-Score is 4.76. A Z-Score above 2.99 is generally considered safe, indicating a low likelihood of bankruptcy. The company's relatively high Z-Score suggests that it exhibits strong financial health and stability, with a reduced risk of encountering financial distress in the near future. The model employs five financial ratios, each assigned specific coefficients, to calculate the Z-Score. These ratios are:

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1. X1 = Working Capital ÷ Total Assets
2. X2 = Retained Earnings ÷ Total Assets
3. X3 = EBIT (Earnings Before Interest and Taxes) ÷ Total Assets
4. X4 = Market Capitalization ÷ Total Liabilities
5. X5 = Sales ÷ Total Assets

The formula for computing the Z-Score is: Z-Score = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.99X5
Now, let's apply the Altman Z-Score model to the financial data for Mar-23:
X1 = 0.228, X2 = 0.925, X3 = 0.914, X4 = 4.00 and X5 = 0.903
Calculating the Z-Score: Z-Score = 1.2(0.228) + 1.4(0.925) + 3.3(0.914) + 0.6(4.00) + 0.99(0.903) Z-Score = 0.2736 + 1.295 + 3.0192 + 2.4 + 0.89547 Z-Score = 7.88327
A Z-Score above 2.99 is generally considered safe, indicating a low probability of bankruptcy. In this case, the company's Z-Score is 7.88, suggesting a robust financial position with a significantly reduced risk of financial distress. The company's strong Z-Score implies it has a solid ability to meet its financial obligations and exhibits sound financial stability. However, while the Altman Z-Score is a valuable tool, it should be used in conjunction with other financial indicators and industry benchmarks for a comprehensive evaluation of the company's financial condition.
The Altman Z-Score is a widely recognized bankruptcy prediction model used to assess a company's financial health and the likelihood of facing bankruptcy within the next two years. The Z-Score is calculated based on five financial ratios (X1 to X5) and specific coefficients, as outlined in the model. In this case, the company's calculated Z-Score for Mar-23 is 7.88. A Z-Score above 2.99 is generally considered safe, indicating a low probability of bankruptcy. Therefore, with a Z-Score of 7.88, the company is exhibiting strong financial health and stability, suggesting a significantly reduced risk of financial distress or bankruptcy in the near future. The high Z-Score is an encouraging sign, indicating that the company has a solid ability to meet its financial obligations and has a sound financial standing. It implies that the company's financial ratios, such as working capital, retained earnings, EBIT, market capitalization, and sales, are in favourable positions compared to the industry benchmarks.

3.3. Mahanagar Telephone Nigam Limited

Table 5: Parameters for MTNL

	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19
Working capital	-663.34	-574.36	-150.51	-298.30	461.27
Total assets	1,210.74	1,364.53	1,508.98	1,714.21	4,602.29
Retained earnings (income-div.)	1119.89	1105.26	1067.76	1112.26	1315.58
Operating income	1,106.17	1,093.80	1,043.66	1,077.74	1,277.20
Market capital	3,737.23	1,954.93	1,954.93	1,954.93	1,954.93
Total liabilities	10,221.39	9,423.40	10,009.02	12,877.39	13,711.93
Sales	1,093.80	1,078.82	1,023.98	1,052.62	1,246.40

The table presents the financial performance of the company over five consecutive periods. The company's working capital demonstrates fluctuating trends over the five periods. It started with a negative value of-663.34, indicating that its current liabilities exceeded current assets, potentially raising concerns about short-term liquidity. However, in the subsequent periods, the working capital improved, reaching a positive value of 461.27, indicating that the company was able to better manage its short-term obligations and increase its liquidity position. The total assets of the company experienced consistent growth over the five periods, starting at 1,210.74 and reaching 4,602.29. This substantial increase suggests the company's expansion and acquisition of more assets, reflecting its business growth and potential opportunities for future profitability. The retained earnings remained relatively stable throughout the five periods. With minor fluctuations, the figures ranged from 1,105.26 to 1,315.58, indicating the company's consistent practice of retaining a portion of its earnings for reinvestment or future use. This stability in retained earnings signifies the company's ability to reinvest in its operations and potentially fund future growth initiatives. The operating income exhibited slight variations without a clear trend over the five periods. The figures ranged from 1,043.66 to 1,277.20, indicating relatively consistent profitability from the company's core business operations. The stability in operating income suggests the company's ability to generate profits despite potential challenges in the market. The market capitalization remained constant at 1,954.93 throughout the five periods, indicating stable stock prices or consistent outstanding shares. It suggests that the market perceived the company's value in a consistent manner during this time. Total liabilities fluctuated over the periods, ranging from 9,423.40 to 13,711.93. This fluctuation indicates varying levels of debt and financial obligations, which could impact the company's financial stability and debt servicing capabilities. The company's sales figures demonstrated minor variations, ranging from 1,023.98 to 1,246.40. These figures suggest relatively consistent revenue generation from the company's business activities over the five periods.
In summary, the analysis reveals both positive and concerning aspects of the company's financial performance. The growth in total assets and stable retained earnings indicate positive financial management and reinvestment capabilities

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Table 6: Altman Z-Score for MTNL

Original z-score model	Coefficient	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19	Variable (avg.)
X_1 = working capital ÷ total asset	1.20	-0.548	-0.421	-0.100	-0.174	0.100	-0.228
X_2 = retained earnings ÷ total assets	1.40	0.925	0.810	0.708	0.649	0.286	0.675
X_3 = ebit ÷ total assets	3.30	0.914	0.802	0.692	0.629	0.278	0.663
X_4 = market capitalization ÷ total liabilities	0.60	0.37	0.21	0.20	0.15	0.14	0.21
X_5 = sales ÷ total assets	0.99	0.903	0.791	0.679	0.614	0.271	0.651
Altman z-score							1.97

The formula for calculating the Altman Z-Score is as follows:

Z-Score = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.99X5

Now the company's financial performance using the Altman Z-Score model with the provided data up to Mar-23 are X1 =-0.548, X2 = 0.925, X3 = 0.914, X4 = 0.37 and X5 = 0.903.

Calculating the Z-Score: Z-Score = 1.2(-0.548) + 1.4(0.925) + 3.3(0.914) + 0.6(0.37) + 0.99(0.903) Z-Score =-0.6576 + 1.295 + 3.0192 + 0.222 + 0.89397 Z-Score = 4.77357

The calculated Altman Z-Score for the company is 4.77. A Z-Score above 2.99 is generally considered safe, indicating a low probability of bankruptcy. In this case, the Z-Score of 4.77 suggests that the company is financially healthy, with a reduced risk of facing financial distress or bankruptcy in the near future.

The company's Altman Z-Score of 4.77 falls above the safe zone, signifying a strong financial position and a lower likelihood of bankruptcy. The positive Z-Score indicates that the company's financial ratios, including working capital, retained earnings, EBIT, market capitalization, and sales, are in favourable positions compared to industry benchmarks. It implies that the company is capable of meeting its financial obligations and is more resilient to financial challenges.

3.4. Bharti Airtel

Table 7: Parameters for Bharti Airtel

	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19
Working capital	64,402.45	53,720.60	39,155.00	43,719.20	32,886.00
Total assets	3,35,577.20	2,84,854.50	2,77,747.10	3,00,372.80	2,22,907.50
Retained earnings (income-div.)	87353.9	72064.7	66713.8	56559.6	52238.7
Operating income	84,720.10	70,641.90	64,325.90	54,317.10	49,606.00
Market capital	2,836.60	2,795.00	2,746.00	2,727.80	1,998.70
Total liabilities	3,35,577.20	2,84,854.50	2,77,747.10	3,00,372.80	2,22,907.50
Sales	84,720.10	70,641.90	64,325.90	54,317.10	49,606.00

Over the five-year period from March 2019 to March 2023, Bharti Airtel, a prominent telecommunications company, demonstrated a consistent and positive financial performance, as evidenced by the data provided in the table. In March 2019, Bharti Airtel had a working capital of ₹32,886.00 Cr, total assets of ₹2,22,907.50 Cr, retained earnings of ₹52,238.7 Cr, operating income of ₹49,606.00 Cr, market capitalization of ₹1,998.70 Cr, and sales revenue of ₹49,606.00 Cr. Over the next five years, Bharti Airtel's financial metrics steadily improved. By March 2020, the working capital increased to ₹43,719.20 Cr, total assets rose to ₹3,00,372.80 Cr, retained earnings climbed to ₹56,559.6 Cr, operating income reached ₹54,317.10 Cr, market capitalization grew to ₹2,727.80 Cr, and sales revenue rose to ₹54,317.10 Cr. In March 2021, Bharti Airtel's financial performance continued its upward trend. The company's working capital increased to ₹39,155.00 Cr, total assets amounted to ₹2,77,747.10 Cr, retained earnings reached ₹66,713.8 Cr, operating income rose to ₹64,325.90 Cr, market capitalization reached ₹2,746.00 Cr, and sales revenue amounted to ₹64,325.90 Cr. By March 2022, Bharti Airtel's financial metrics showed further improvement. The working capital increased to ₹53,720.60 Cr, total assets reached ₹2,84,854.50 Cr, retained earnings climbed to ₹72,064.7 Cr, operating income rose to ₹70,641.90 Cr, market capitalization amounted to ₹2,795.00 Cr, and sales revenue grew to ₹70,641.90 Cr. Finally, in March 2023, Bharti Airtel's financial performance reached new heights. The working capital increased to ₹64,402.45 Cr, total assets rose to ₹3,35,577.20 Cr, retained earnings amounted to ₹87,353.9 Cr, operating income reached ₹84,720.10 Cr, market capitalization amounted to ₹2,836.60 Cr, and sales revenue grew to ₹84,720.10 Cr. The data clearly illustrates Bharti Airtel's impressive growth and financial strength over the five-year period. The company has consistently increased its working capital, which demonstrates its ability to efficiently manage short-term obligations. Total assets have been steadily growing, indicating continuous investments and expansion in its business operations. Retained earnings have consistently increased over the years, showcasing the company's ability to generate profits and reinvest them for future growth. Operating income and sales revenue have also experienced consistent growth, indicating that the company's core business operations have been successful in generating higher profits and revenue. Furthermore, the market capitalization has witnessed a steady rise, reflecting the growing confidence of investors in Bharti Airtel's future prospects and financial performance. Overall, Bharti Airtel's financial performance appears robust and promising, positioning the company well for continued growth and success in the telecommunications industry.

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Table 8: Altman Z-Score for Bharti Airtel

	Co-eff.	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19	Variable (avg.)
X_1 = working capital ÷ total asset	1.20	0.192	0.189	0.141	0.146	0.148	0.163
X_2 = retained earnings ÷ total assets	1.40	0.260	0.253	0.240	0.188	0.234	0.235
X_3 = ebit ÷ total assets	3.30	0.252	0.248	0.232	0.181	0.223	0.227
X_4 = market capitalization ÷ total liabilities	0.60	0.01	0.01	0.01	0.01	0.01	0.01
X_5 = sales ÷ total assets	0.99	0.252	0.248	0.232	0.181	0.223	0.227
Altman z-score							0.86

The table represents the calculations for each component of the original Z-Score model (Altman Z-Score) for a company over five years, from March 2019 to March 2023, along with the average values for each variable. The Altman Z-Score is a bankruptcy prediction model that utilizes five financial ratios to assess a company's financial health and potential risk of bankruptcy within the next two years.

1. **X1 = Working Capital ÷ Total Asset:** This ratio measures the proportion of working capital (current assets minus current liabilities) to total assets. A higher value indicates better short-term liquidity and the ability to cover short-term obligations with its current assets. The average value for X1 over the five years is 0.163.
2. **X2 = Retained Earnings ÷ Total Assets:** This ratio evaluates the percentage of retained earnings (accumulated profits not paid as dividends) relative to total assets. It measures the profitability and efficiency of the company in generating earnings from its assets. The average value for X2 over the five years is 0.235.
3. **X3 = EBIT ÷ Total Assets:** This ratio represents the percentage of earnings before interest and taxes (EBIT) to total assets. It reflects the company's ability to generate profits from its assets. A higher value indicates higher profitability. The average value for X3 over the five years is 0.227.
4. **X4 = Market Capitalization ÷ Total Liabilities:** This ratio assesses the market capitalization relative to total liabilities, which can indicate the company's financial risk and ability to cover its liabilities. The value is constant at 0.01 for all years, suggesting a consistent low market capitalization relative to total liabilities.
5. **X5 = Sales ÷ Total Assets:** This ratio evaluates the company's ability to generate sales revenue relative to total assets. A higher value indicates efficient utilization of assets to generate revenue. The average value for X5 over the five years is 0.227.

Altman Z-Score: The Altman Z-Score is a composite score that summarizes the company's financial health by combining the above five ratios. In this case, the Altman Z-Score for the company in March 2023 is 0.86.

The Altman Z-Score is used to predict the likelihood of a company facing financial distress or bankruptcy within the next two years. A Z-Score below 1.81 suggests that the company is in the distress zone and is at higher risk of facing financial difficulties. In this case, the company's Z-Score of 0.86 indicates that it is in the distress zone, implying that the company may face financial challenges and requires close monitoring and further analysis to understand its financial health accurately.

3.5. Vodafone Idea

Table 9: Parameters for Vodafone Idea

	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19
Working capital	-6,360.40	-4,474.10	-6,137.60	3,663.60	-21,288.70
Total assets	2,07,273.10	1,93,931.40	2,03,131.40	2,28,886.30	2,33,053.10
Retained earnings (income-div.)	42187.8	38318.2	41931.1	45801.1	37932.1
Operating income	41,917.10	38,220.70	41,672.70	44,715.00	36,858.80
Market capital	48,679.70	32,118.80	28,735.40	28,735.40	8,735.60
Total liabilities	2,07,273.10	1,93,931.40	2,03,131.40	2,28,886.30	2,33,053.10
Sales	41,884.10	38,202.40	41,658.90	44,683.00	36,766.80

Over the five-year period from March 2019 to March 2023, the financial performance of the company exhibited fluctuations in various key metrics. The company's working capital, which represents the ability to cover short-term obligations with current assets, was negative in March 2019, standing at-21,288.70. This indicates that the company had more short-term liabilities than short-term assets at that time, potentially signalling financial strain. However, over the subsequent years, the working capital improved, turning positive in March 2020 and March 2021. However, in March 2023, the working capital once again showed a negative value of-6,360.40, indicating potential liquidity challenges. Total assets represent the company's resources and investments. The company's total assets remained relatively stable over the five years, with slight fluctuations between 2,07,273.10 and 2,33,053.10. This indicates that the company maintained a consistent level of investments and assets during this period. Retained earnings, representing the cumulative profits not distributed as dividends, also displayed variability. The value increased over the years, reaching its peak in March 2023 at 42,187.8. This suggests that the company was able to retain a higher portion of its earnings in recent years, potentially for reinvestment or growth initiatives. The company's operating income, reflecting the profits generated from its core business activities, fluctuated over the years. Similarly, the sales revenue also displayed variations. These fluctuations may be influenced by changes in market conditions, competition, and the company's operational efficiency. Market capitalization, which represents the total value of a company's outstanding shares, showed a substantial increase over the years, rising from 8,735.60 in March 2019 to 48,679.70 in March 2023. This significant growth in

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market capitalization indicates an increasing investor confidence in the company's future prospects and financial performance. The company's total liabilities remained relatively stable, reflecting a consistent level of financial obligations.

In conclusion, the company experienced fluctuations in several financial metrics over the five-year period. While market capitalization showed a significant increase, other indicators, such as working capital and operating income, displayed volatility. It is important to note that this analysis is based on limited financial data, and further detailed examination and context-specific factors are necessary to make accurate and comprehensive assessments of the company's financial health and performance.

Table 10: Altman Z-Score for Vodafone Idea

Original z-score model	Coefficient	Mar-23	Mar-22	Mar-21	Mar-20	Mar-19	Variable (avg.)
X_1 = working capital ÷ total asset	1.20	-0.031	-0.023	-0.030	0.016	-0.091	-0.032
X_2 = retained earnings ÷ total assets	1.40	0.204	0.198	0.206	0.200	0.163	0.194
X_3 = ebit ÷ total assets	3.30	0.202	0.197	0.205	0.195	0.158	0.192
X_4 = market capitalization ÷ total liabilities	0.60	0.23	0.17	0.14	0.13	0.04	0.14
X_5 = sales ÷ total assets	0.99	0.202	0.197	0.205	0.195	0.158	0.191
Altman z-score							0.69

The table presents the calculations for each component of the original Z-Score model (Altman Z-Score) for a company for five consecutive years, from March 2019 to March 2023. The Z-Score model, developed by Professor Edward Altman, is a bankruptcy prediction tool that uses financial ratios to assess a company's financial health and risk of bankruptcy within the next two years.

1. **X1,** a positive value indicates that the company has more current assets than current liabilities, which is generally favourable for short-term liquidity. However, in this case, the values are mostly negative, ranging from-0.091 to-0.031, except for a positive value of 0.016 in March 2020. This suggests that the company faced challenges in maintaining positive working capital, which might have implications for its short-term financial stability.
2. **X2, a** higher value signifies that the company has retained a larger portion of its earnings, indicating better profitability and financial stability. The values for X2 range from 0.163 to 0.206, which indicates a consistent positive trend in retaining earnings over the years, reflecting potential financial strength.
3. **X3,** measures the company's ability to generate profits from its assets. The values for X3 range from 0.158 to 0.205, indicating a consistent performance in generating profits relative to the total assets.
4. **X4,** the values are mostly positive, ranging from 0.04 to 0.23, suggesting that the company's market capitalization has been higher than its total liabilities. A higher value in this ratio is generally favourable as it indicates a stronger financial position.
5. **X5, t**he values for X5 range from 0.158 to 0.205, indicating the company's consistent ability to generate revenue from its assets.

The Altman Z-Score is a composite score calculated by summing up the products of each ratio with its respective coefficient. The Z-Score for the company in March 2023 is 0.69. The Altman Z-Score is used to predict the likelihood of a company facing financial distress or bankruptcy within the next two years. A Z-Score below 1.81 suggests that the company is in the distress zone and is at higher risk of facing financial difficulties. In this case, the company's Z-Score of 0.69 in March 2023 indicates that it is in the distress zone, implying that the company may be facing financial challenges and requires careful monitoring and further analysis to understand its financial health accurately. It is essential to consider that the Z-Score is a statistical tool and should be used as a preliminary indicator. A comprehensive assessment of the company's financial health should include a thorough financial analysis, considering other relevant factors and potential industry-specific influences on financial performance and stability.

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4. Statistical Analysis of Telecom Sector

Table 11: Descriptive Statistics for Telecom Sector

Company	Variable	Mean	SD	CV
Reliance communication	X1	0.306	0.097379	31.82
	X2	0.013	0.00626	47.24
	X3	0.013	0.005825	44.76
	X4	0.072	0.013726	19.11
	X5	0.013	0.005825	44.76
Tata telecom	X1	0.385	0.13102	34.07
	X2	0.675	0.281937	41.75
	X3	0.662	0.279343	42.20
	X4	2.388	1.187951	49.74
	X5	0.691	0.231586	33.51
Mtnl	X1	-0.23	0.260366	-113.76
	X2	0.675	0.281937	41.75
	X3	0.662	0.279343	42.20
	X4	0.213	0.097768	45.95
	X5	0.691	0.231586	33.51
Bharti airtel	X1	0.163	0.023197	14.22
	X2	0.236	0.023827	10.11
	X3	0.223	0.020983	9.42
	X4	0.009	0.000752	8.14
	X5	0.223	0.020983	9.42
Vodafone idea	X1	-0.03	0.051271	-163.01
	X2	0.194	0.01945	10.02
	X3	0.192	0.019364	10.09
	X4	0.142	0.064233	45.30
	X5	0.192	0.018544	9.66

Reliance Communication: This company shows moderate values for all variables (X1, X2, X3, X4, and X5). The coefficients of variation (CV) indicate moderate to high variability in these variables. The mean values of X1, X2, and X3 suggest that the working capital, retained earnings, and EBIT in relation to total assets are at a moderate level. X4 (Market Capitalization ÷ Total Liabilities) shows a higher CV, indicating more variation in this ratio compared to other companies.

Tata Telecom: Tata Telecom displays relatively higher mean values for X1, X2, X3, and X5, indicating strong working capital, retained earnings, EBIT, and interest earned in relation to total assets. However, X4 (Market Capitalization ÷ Total Liabilities) has a high CV, indicating significant variation over the years.

MTNL: MTNL has negative mean values for X1 and X4, suggesting that its working capital in relation to total assets and market capitalization relative to total liabilities are not in favourable positions. Additionally, MTNL exhibits high variability in X1 and X4, with notably high negative CV for X1, indicating substantial fluctuations in working capital over the years.

Bharti Airtel: Bharti Airtel shows the lowest mean values for X1, X2, X3, and X5 compared to other companies. This suggests lower working capital, retained earnings, EBIT, and interest earned in relation to total assets. However, X4 has a low CV, indicating relatively stable market capitalization relative to total liabilities over the years.

Vodafone Idea: Vodafone Idea exhibits negative mean values for X1 and moderate mean values for other variables. The negative mean for X1 indicates that the working capital is in a distressed state. The CV for X1 is particularly high, implying significant fluctuations in working capital.

Among the selected telecommunication companies, Tata Telecom emerges as the most financially robust with higher mean values for important financial ratios like working capital, retained earnings, EBIT, and interest earned relative to total assets. On the other hand, MTNL and Vodafone Idea face financial distress, as indicated by negative mean values for some ratios and high variability in key financial metrics.

Based on the comparative analysis, Tata Telecom stands out as the financially strongest company among the selected telecommunication firms, with healthier working capital, retained earnings, and EBIT ratios. MTNL and Vodafone Idea, on the other hand, are facing financial challenges, as evidenced by negative mean values and higher variability in certain financial ratios. Bharti Airtel falls in between with moderate financial performance.

It is important to consider these financial ratios alongside other qualitative and quantitative factors when making investment decisions or assessing the overall financial health of these companies. Further in-depth analysis and monitoring of the financial performance of these companies will be essential for making informed decisions in the dynamic telecommunications industry.

Null Hypothesis (H0): There is no significant difference between the means of the groups (Ratios and Years) for telecom sector companies under study.

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Alternative Hypothesis (Ha): There is a significant difference between the means of the groups for telecom sector companies under study.

Table 12: ANOVA of Telecom Sector

ANOVA of telecom sector						
Source of variation	Ss	Df	Ms	F	P-value	F crit
Ratios	29.873	24	1.245	17.058	7e-25	1.631
Years	1.102	4	0.276	3.776	0.0068	2.466
Error	7.005	96	0.073			
Total	37.980	124				

The ANOVA (Analysis of Variance) table presented above provides a comprehensive breakdown of the sources of variation and their significance in hypothesis testing. The table contains three main sources of variation: "Ratios," "Years," and "Error," along with their corresponding degrees of freedom and sum of squares. The "Ratios" factor, which represents the variability between different ratios, has a substantial sum of squares (SS = 29.873) and a highly significant F-statistic (F = 17.058) with an extremely small p-value (6.89591E-25). This indicates a clear rejection of the null hypothesis, providing strong evidence for significant differences between the means of various ratios. Similarly, the "Years" factor shows significant differences as well. It has a significant F-statistic (F = 3.776) with a p-value of 0.00676734, suggesting that there are significant variations between the means of different years. Consequently, we reject the null hypothesis for the "Years" factor as well. The "Error" term represents within-group variability and serves as the denominator in calculating the F-statistics for both factors. Its mean square (MS = 0.073) provides an estimate of the variability within the groups. In summary, the ANOVA results demonstrate that both the "Ratios" and "Years" factors have a considerable impact on the data, and there are significant differences between the means of different ratios and different years. The extremely low p-values strongly support the rejection of the null hypothesis, indicating that the variations observed are not due to random chance but are indeed significant and meaningful. These findings have important implications for understanding the underlying factors influencing the data and can guide further investigations and decision-making processes.

Conclusion

The provided research present key financial parameters for several companies in the telecommunications sector, including Reliance Communication, Tata Telecommunication, MTNL, Bharti Airtel, and Vodafone Idea, over a span of five years. These parameters encompass a range of financial indicators such as Working Capital, Total Assets, Retained Earnings, Operating Income, Market Capital, Total Liabilities, and Sales. Analysing these data reveals certain trends and variations in the financial health and performance of the respective companies across the specified years. Notably, Bharti Airtel displays consistent growth in Working Capital, Total Assets, Retained Earnings, Operating Income, and Sales, accompanied by a rise in Market Capital. Reliance Communication demonstrates fluctuations in various parameters, and Vodafone Idea shows periods of negative Working Capital and fluctuating Operating Income and Sales. Tata Telecommunication exhibits relatively stable financial metrics over the years, while MTNL experiences challenges such as negative Working Capital and a substantial rise in Total Liabilities. These data provide valuable insights into the financial dynamics of the telecommunications industry and can inform decision-making and strategic planning for stakeholders.

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