

Critical analysis of bankruptcy risk using Altman's Z-score model of India Cement Ltd. (2020-2024)

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Abstract

Analyzing bankruptcies is a crucial aspect of studying finance. Determining the likelihood that a company won't pay its bills is the primary objective. With the use of advanced statistical techniques, researchers can predict the financial distress of companies. Such statistical models can enhance prediction, improve accuracy, and increase the interpretability of results. It is essential for stakeholders, investors and lenders who thoroughly rely on such predictions for decision-making. Numerous studies have identified mathematical models that are used to interpret the bankruptcy conditions of companies. This research is primarily focused on a notable approach used in bankruptcy prediction. The creator of this approach gave it the name Altman Z-Score model. Given that India Cement Ltd. is one of the most well-known cement companies in the country, the researcher decided to focus their attention on the company for the study. The likelihood of India Cement Ltd.'s bankruptcy has been assessed by analyzing its financial records, particularly its five-year profit and loss statement and balance sheet. By applying the Altman Z score formula and analyzing several factors, the researcher determined that the company's Altman Z score is 0.717. This is a clear indication that India Cement Ltd. is facing financial challenges. The main reason affecting the Z score of the company was the ratio between working capital and its total assets. It indicates the company's poor management practices in handling working capital. Hence, the study concludes that India Cement Ltd. is in the "Distress Zone" and has a high likelihood of entering financial bankruptcy in the future due to its unstable Z score.

Subject Classification: 91G80, 91G70.

Keywords: Altman Z score, Bankruptcy, Financial ratios, Distress zone.

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1. Introduction

An objective that every corporation should consider is how to maximize shareholder wealth and, by extension, the firm's value. This goal can be achieved by increasing its profitability and achieving a specific sales volume. A thorough review of the company's financial statements is required, as they serve as an evaluation tool for the company's financial health by highlighting the most essential facts and figures regarding the company's economic performance. But also, the financial soundness of the company. This analysis further helps investors understand the company's financial soundness and prospects. For lenders, a company's creditworthiness is always considered a crucial factor. When considering whether to purchase the company's stock or obtain loans, investors and other stakeholders should first assess the company's creditworthiness and financial health.

In alignment with earlier studies on financial performance evaluation, Gupta et al. [10] emphasized the importance of financial ratios in understanding economic strength and guiding investment decisions in the power and energy sector. Several researchers have applied statistical and ratio-based models to predict corporate failure across industries [1]. The findings of their study highlight the broader significance of analyzing key financial indicators and reinforcing the relevance of the present study's objective to examine the financial structure and viability of India Cements Ltd. through a comprehensive financial assessment framework.

Prof. Edward Altman developed the Z-score model in 1968 [2], a year marked by a global fiscal crisis, which was a particularly challenging time for corporations and economies worldwide. It puts pressure on the stability of the International Monetary Policy system. The first thing that was proven was that the model had a success rate of 72% in accurately predicting the company's bankruptcy two years in advance. Prof. Edward Altman examined more than sixty companies, out of which fifty per cent had declared bankruptcy during the period 1946 to 1965. His analysis was based on 22 different indicators, which were classified into five major groups based on volatility, solvency, productivity, and mobility. Prior empirical studies have successfully employed the Altman Z-score model for bankruptcy assessment in different Indian industries such as steel and cement [6], [7], [8].

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sales volume. A thorough review of the company's financial statements is required, as they serve as an evaluation tool for the company's financial health by highlighting the most essential facts and figures regarding the company's financial performance. The score is a numerical value which proposes the creditworthiness of the company. To analyze a company's creditworthiness, this model emphasizes various financial aspects of the company, such as working capital, Operating Profit, Retained Earnings, market capitalization, total assets, and Total Liabilities. To arrive at the Z score, the technique analyses a wide range of financial metrics. These metrics offer further insight into the company's financial position and its ability to manage financial challenges. In the context of analyzing creditworthiness, this model has also been adopted to evaluate financial sustainability of large corporations in India [9].

The formula above can be used to determine the Z score following the Altman model.:

$$\text{Altman Z-Score} = "1.2 * X1 + 1.4 * X2 + 3.3 * X3 + 0.6 * X4 + 1.0 * X5$$

Where, **X1 = Working Capital / Total Assets**

X2 = Retained Earnings / Total Assets

X3 = Earnings before Interest and Taxes / Total Assets

X4 = Market Capitalization / Total Liabilities

X5 = Sales / Total Assets"

Bankruptcy prediction of the manufacturing company can be done using the Z score as follows:

If "Z score is greater than 2.99 shows a firm is in a Safe Zone, if the Z score is between 1.81 to 2.99 shows a firm is in the Grey Zone, and if the Z score is less than 1.81 shows a warning signal that the firm is in the Distress Zone".

Here are those five major key factors of the model helping to determine the organization's monetary status and further the chance of bankruptcy.

- 1 Working Capital/Total Asset (X1):** The word "working capital" refers to the amount of money that a business has on hand that is not immediately needed to pay for expenses or other immediate obligations. It is possible to turn current assets into cash in a year if operations are consistent. The average repayment period for current debt is less than a year. Accurately projecting working capital by utilizing the current assets to current liabilities ratio can lead to favorable outcomes. How well a business oversees its day-to-day operations and pays its debtors is a good indicator of its working

capital worth. A negative working capital value indicates that a company is experiencing financial difficulties. This financial phrase refers to the ratio of an organization's working capital to its total assets. A company's working capital to total assets ratio measures this. You can use this method to determine a company's liquidity and its ability to settle its short-term debt.

- 2 **Retained Earnings/Total Assets (X2):** Retained earnings are the remaining amount of operational profit after all expenses connected to financing, income taxes, and dividends have been subtracted from the total amount of operational profit. The quantity of a company's earnings used to fund its assets can be determined by calculating the ratio of the company's retained earnings to its total assets. Through the utilization of this data, the extent of the organization's bankruptcy can be evaluated. A lower ratio implies that the company is leveraged and relies more heavily on borrowed money to operate, increasing the likelihood that it may declare bankruptcy. Even though a ratio of one to one appears to be ideal in theory, it is not possible in practice..
- 3 **EBIT/Total Assets (X3):** To evaluate a company, this ratio, also known as return on total assets, assesses a business by comparing its operational profits with its overall assets. The operating earnings to total assets ratio are one technique to determine a company's efficiency. A high ratio implies that the company is profitable relative to its total assets, indicating that it is effectively utilizing its resources...
- 4 **Market Capitalization of the firm/Total Liabilities (X4):** The market capitalization of a company is one indicator of its worth in the market. When the market value of a firm is taken into consideration, this ratio determines the point at which the liabilities of a company would exceed its assets if the company were to file for bankruptcy administration. By adding this ratio, the market value of the Altman Z model is enhanced by a component that is not solely based on facts. Through an examination of the company's current financial situation, this ratio provides investors with a means of determining the possibility that a company may file for bankruptcy within the near future. On the other hand, a high ratio indicates that investors have faith in the company's ability to pay its bills.
- 5 **Sales/Total Assets (X5):** This indicator also has another name, the asset turnover ratio. This term refers to the effectiveness with which the company converts its assets into cash. An increase in the ratio

is indicative of a corporation's effectiveness in transforming its resources into revenue-generating opportunities. When it comes to the analysis that DuPont examines the success of each business unit, it is one of the cornerstones.

Although China produces more cement overall, India ranks second globally in cement production. As a result of its cutting-edge technological capabilities and enormous economy, China has proven to be a formidable adversary. The Indian cement sector has been examined widely with respect to its structural challenges, profitability drivers and future growth prospects [3], [4], [5]. In this context, Cement production assumes critical importance in supporting India's infrastructure expansion and overall economic development.

For the sector to achieve sustained growth and generate substantial employment opportunities, supportive policy and investment frameworks are essential. With considerable room for growth in India's construction and infrastructure industries, the cement industry is poised to benefit from the country's expanding manufacturing sector.

In the southern region of India, India Cement Ltd. is the most significant cement producer. The organization provides its services to the most important markets in South India and Maharashtra. The state of Tamil Nadu is home to four industries, while Andhra Pradesh is home to two of them. The cement manufacturing industry in southern India is controlled by India Cement Ltd., which also holds a 28 per cent share of the market. Their network of distribution comprises approximately 10,000 different merchants. The first cement plant owned by the firm was established in Sankarnagar in 1949. It had an annual installed capacity of one lakh tonnes before it was opened. 1963 marked the beginning of operations at Sankaridrug, the company's second cement factory, which was capable of producing two lakh tons of cement annually. Due to their outstanding performance in the export market, they were awarded Merit Certification in 1968 and 1969. Sankari Drug raised its installed capacity to 6 lakh tonnes per year in 1971. This was a significant step forward for the company. The Coromandel Cement Plant, located in Cuddapah, was acquired by the company in 1990. Through the implementation of a dry process, they were able to raise the capacity of the Sankarnagar Plant to one million tons per year. India Cement Ltd., which holds a 25 per cent market share, has been experiencing significant financial difficulties from 2020 to 2024. It is the primary cement company in the southern region of India. The decline in the company's profitability and the number of sales

is the key factors contributing to this situation. According to the negative compound annual sales growth rate of -0.35% from 2020 to 2024, the company's sales have been steadily decreasing during this period. India Cements Ltd. believes that falling sales and profitability are the primary reasons behind this situation. With a compound annual growth rate of -0.35%, the company's sales have been consistently declining from 2020 to 2024, resulting in a steady decline in sales and profitability from 2020 until the beginning of 2025. This decline is attributed to several factors, including a decrease in demand, rising operating expenses, and an increase in the number of competitors.

Objectives:

1. To examine the financial health of India Cement Ltd. based on various ratios used in the Altman Z-score model.
2. To determine the bankruptcy status of India Cement Ltd. in terms of the Altman Z Model.

Research Methodology

The financial statements of India Cement Ltd. were the only secondary data source that was utilized for the research project. Due to the limited amount of time available, the researcher chose to conduct this study using convenience sampling. A design that did not utilize probability was employed by the researcher to conduct the sampling process. For data analysis, this study employs the Altman Z-score model, with a particular focus on the Indian cement industry. The primary focus of the investigation is on India Cement Ltd.'s financial situation for the period spanning from 2020 to 2024. One limitation of the study is that it only examined one particular company and industry.

Data Analysis*Financial Position Analysis:*

The Financial structure of India Cements Ltd. has been examined using balance sheet data for the period Yr. 2020 – 2024, as presented in Table 1. The table summarizes the company's equity position, long-term and short-term liabilities, and asset composition over the study period.

Table 1
The Financial Extracts from the Balance Sheet of India Cement Ltd.

Extracts from Balance sheet Equities & Liabilities (Rs.' Cr)	March 2024	March 2023	March 2022	March 2021	March 2020
Shareholder's Funds					
<i>Equity Share Capital</i>	309.9	309.9	309.9	309.9	309.9
<i>No. of Shares Outstanding</i>	31.3984	36.1680	1.0710	28.4545	-9.8792
<i>Total Equity Capital</i>	309.9	309.9	309.9	309.9	309.9
<i>Reserve & Surplus</i>	5,089.11	5,288.97	5,073.75	5,308.06	5,105.01
<i>Total Shareholders' Funds</i>	5,399.00	5,598.86	5,818.08	5,617.96	5,414.91
<i>Long-term Borrowings</i>	1,415.26	1,799.24	1,928.70	1,979.81	2,374.99
<i>Deferred Tax Liabilities [Net]</i>	232.37	283.62	529.5	553.77	591.04
<i>Other Long-Term Liabilities</i>	503.4	555.34	633.9	88.92	111.2
<i>Long Term Provisions</i>	154.05	172.86	184.92	96.26	122.36
<i>Total Non-Current Liabilities</i>	2,305.09	2,811.07	3,277.02	2,718.76	3,199.59
<i>Short-term Borrowings</i>	1,185.97	1,119.32	1,134.45	463.64	741.91
<i>Trade Payables</i>	1,220.11	1,329.97	1,287.54	1,076.26	1,331.21
<i>Other Current Liabilities</i>	256.69	268.65	224.12	997.2	764.63
<i>Short Term Provisions</i>	78.29	57.77	43.58	0.18	0.18
<i>Total Current Liabilities</i>	2,741.06	2,775.70	2,689.68	2,537.28	2,837.93
<i>Total Liabilities</i>	5,046.15	5,586.77	5,966.70	5,256.04	6,037.52
Total Capital & Liabilities	10,445.15	11,185.64	11,784.78	10,874.00	11,452.43
<i>Assets (Rs.' Cr.)</i>	<i>March 2024</i>	<i>March 2023</i>	<i>March 2022</i>	<i>March 2021</i>	<i>March 2020</i>
<i>Total Fixed Assets</i>	6,813.16	6,859.93	6,959.06	6,857.07	7,021.60
<i>Long-term Investments</i>	490.96	489.81	775.55	744.33	735.75
<i>Long-Term Loans and Advances</i>	162.39	180.2	1,251.71	1,201.52	1,125.09
<i>Total Non-Current Assets</i>	7,880.87	7,987.09	9,402.92	9,223.54	9,275.94
<i>Current Investments</i>	1.03	3.97	3.96	1.82	1.19
<i>Inventories</i>	621.82	774.82	834.4	583.77	826.26
<i>Trade Receivables</i>	693.01	814.12	921.28	541.24	716.26
<i>Cash And Cash Equivalents</i>	13.56	15.72	1.82	6.76	6.63
<i>Short Term Loans & Advances</i>	796.28	1,085.32	31.09	43.81	43.81
<i>Other Current Assets</i>	438.58	504.6	589.32	473.05	582.34
<i>Total Assets</i>	10,445.15	11,185.64	11,784.78	10,874.00	11,452.43

(Source: Annual Reports of India Cement Ltd.)

Table 1 presents the financial extracts from the balance sheet of India Cements Ltd., indicating a steady decline in shareholders' funds and a rising dependency on both long-term and short-term borrowings. The consistently high level of total liabilities compared to equity reflects increased financial leverage, which adversely impacts the firm's solvency position.

Profitability Analysis:

The profitability performance of India Cements Ltd. has been evaluated using the Income Statement data summarized in Table 2.

Table 2
The Financial Extracts from the P&L A/c of India Cement Ltd.

<i>Extracts from P/L Account</i>	<i>March 2024</i>	<i>March 2023</i>	<i>March 2022</i>	<i>March 2021</i>	<i>March 2020</i>
Total Sales after stock adjustment	4,996.76	5,415.08	4,729.83	4,460.12	5,085.28
Expenditure					
<i>Cost of Materials Consumed (Raw Materials)</i>	882.57	947.92	784.87	701.5	925.88
<i>Power & Fuel Cost</i>	1,836.09	2,427.38	1,526.15	1,057.28	1,355.09
<i>Employee Cost</i>	374.69	358.32	332.19	331.03	349.89
<i>Other Manufacturing Expenses</i>	103.65	106.63	64.12	62.42	91.61
<i>Selling and Admin Expenses</i>	42.13	15.87	16.46	10.59	24.28
<i>Miscellaneous Expenses</i>	1,491.45	1,650.65	1,512.18	1,351.21	1,697.02
Total Expenses	4,791.91	5,605.18	4,280.14	3,553.95	4,496.99
Operating Profit (Net EBIT)	108.98	-174.46	461.12	806.11	585.21
Reported Net Profit	-202.52	-188.55	38.98	222.04	-35.51
Dividend	0	30.99	30.99	18.59	29.89
Retained Earnings	-202.52	-219.54	7.99	203.45	-65.4

(Source: Annual Reports of India Cement Ltd.)

Table 2 highlights a declining sales trend and volatile operating profits during the study period. Despite moderate revenue generation, increasing power and fuel costs, along with high miscellaneous expenses, have eroded operating profit margins. The presence of negative net profits

in multiple years further indicates operational inefficiency and financial stress.

Altman Z-Score Analysis:

The Altman Z-Score for India Cements Ltd. has been computed using the financial ratios derived from Tables 1 and 2, and the detailed factor-wise analysis is [resented in Table 3.

Table 3
Factor ANALYSIS OF ALTMAN Z SCORE

<i>Z Score Analysis</i>	<i>March 2024</i>	<i>March 2023</i>	<i>March 2022</i>	<i>March 2021</i>	<i>March 2020</i>
Working Capital	-2,302.48	-2,271.10	-2,100.36	-2,064.23	-2,255.59
Debt/Equity Ratio	4.567	5.806	6.224	6.389	7.664
EPS	-6.450	-6.070	7.460	7.150	6.620
MPS	217.600	185.410	220.440	188.250	104.000
P/E Ratio	-33.736	-30.545	29.550	26.329	15.710
Market Value of Equity	6,832.303	6,705.916	236.101	5,356.568	-1,027.43
Working Capital/Total Assets	-0.220	-0.203	-0.178	-0.190	-0.197
Retained Earnings/Total Assets	-0.019	-0.020	0.001	0.019	-0.006
EBIT/Total Assets	0.010	-0.016	0.039	0.074	0.051
Market Capitalization/Total Liabilities	1.354	1.200	0.040	1.019	-0.170
Sales / Total Assets	0.478	0.484	0.401	0.410	0.444
Z Score	1.034	0.882	0.341	1.065	0.266
Average Z Score	0.717				

(Source: Prepared by the researcher)

Table 3 reports the year-wise Z-score values and their underlying components. The Z-scores for all five years remain below the threshold value of 1.81, placing the company consistently in the Distress Zone. The average Z-score of 0.717 clearly signals a high profitability of financial distress and potential bankruptcy.

Findings And Interpretation:

The Altman Z-score model was developed by an individual named Edward Altman. A company's likelihood of declaring bankruptcy during

the next two years can be predicted using this model, which is a financial indicator. Activeness, profitability, leverage, and liquidity are the five distinct financial factors that the model takes into consideration when analyzing the company. These parameters constitute the basis of the model's ability to anticipate a financial disaster.

This means that India Cement Ltd.'s Altman Z score could fall anywhere between 0.226 and 1.034 over the years 2020 and 2024 on average. For the previous five years, the company has had an average Altman Z score of 0.717, which places it solidly in the "Distress Zone." This is a further insult to the injury that has already been done. This is not a good sign for the company's capacity to maintain its financial stability in the future.

The following are the assorted reasons assessed by the researcher about the trajectory of India Cement Ltd. based on the Z Score analysis of the company.

1. It is necessary to have a significant amount of working capital in order to guarantee the liquidity of the company in the intermediate term. Having a good working capital position indicates that a company can sustain a healthy position. This condition implies that the company's liquid assets are sufficient to meet its short-term obligations...Throughout the entirety of its existence, India Cement Ltd. has continually maintained a negative working capital. The liquidity of the corporation, which comprises both cash and current investments, has experienced a discernible decrease in recent times. On the other hand, the organization is significantly expanding its utilization of short-term borrowing. In comparison to the amount of trade payables, trade receivables are typically half as much. As a direct consequence of this, the company's working capital has a negative trend over the duration of the investigation. This will result in a negative working capital to total asset ratio, which is another indication that the company is having difficulty meeting its short-term commitments. This ratio will be caused by the reasons stated above. It would appear that the company is employing a greater amount of short-term borrowing than it is utilizing its present assets in order to pay its operational expenses. For an extended period of time, the ratio has been negative, which suggests that the company is either suffering financial difficulties or may soon be going bankrupt.

2. In addition, the high debt-to-equity ratio is another consideration to consider. A debt-to-equity ratio of 1:2 is thought to give a stronger buffer than a ratio of 2:1, according to the theory. The company's high debt-to-equity ratio, which fluctuated from 4.6 to 7.6 throughout the course of the research period, stayed stable throughout the entire period. The company appears to be adding more debt than equity into its capital structure, which indicates that they have a significant amount of debt and are required to pay a significant amount of interest on that debt. Net income falls when a corporation has a lot of debt in its capital structure. There will be a drop in retained earnings as well. Under these conditions, retained earnings as a percentage of total assets are negative. A ratio that is negative shows that the company has accrued losses that are greater than the earnings that it has generated. This is yet another indication that the company is experiencing financial difficulties and is placing an excessive amount of reliance on debt rather than reinvesting its gains..
3. The next factor to consider was the exceptionally low operational profit margin that the company continuously maintained. The remaining amount that remains after deducting all of the operational expenditures from the sales that a firm generates from its principal activity is referred to as the operating profit. The insufficient operating profit margin of India Cement Ltd. can be attributed to a number of factors, the most important of which are the declining sales trend and the fact that ninety per cent of revenues are spent on selling and distribution, office and administrative expenditures, manufacturing, and raw material prices. This being the primary driver, we anticipate a -0.35% CAGR (compound annual growth rate) in the company's sales from 2020 to 2024. The company's sales growth was negative if the five-year research shows a negative compound annual growth rate (CAGR) for sales. The decline in sales can be attributed to a fight over prices as well as intense competition in the market. The majority of the company's revenue, which accounted for approximately 30–40% of the total expenditures, was generated by the sale of fuel, power, and various other supplies. The miscellaneous charges, which should be relatively little in comparison to other regular expenses but make up a larger percentage of sales, are the primary reason for the decline in the operational profit of India Cement Ltd., which is the primary reason for the fall in the operational profit. As a consequence of this, the income generated from operations will also decrease. This demonstrates that the organization is inefficient in terms of both generating income and the management of costs.

- 4 The ratio of asset turnover is decreasing, which is having an impact on sales performance. According to the findings of the investigation, India Cement Ltd. was not generating sufficient revenue from its sales. When it comes to the generation of revenue, it would appear that the assets of the organization are not being exploited to their full capacity within the company..
- 5 The company received an average Altman Z score of 0.717 from the years 2020 to 2024, which indicates that the company is experiencing financial difficulties and may soon be filing for bankruptcy..

Recommendation:

Since operational profit is the primary source of earnings after taxes and expense management for any manufacturing company, the reduction in the Altman Z score appears to be primarily linked to the fact that operational profit is low. It is necessary for the management of India Cement Ltd. to conduct a thorough analysis of the company's cost structure to achieve a higher Altman Z score. The simplification of processes, the negotiation of prices for raw materials, the limiting of costs for fuel and energy, and the optimization of usage are all processes that can be used to reduce operating expenses. Therefore, operational profit would increase, and overall expenses would decrease for the business. India Cement Ltd.'s high debt-to-equity ratio is one reason the company has an exceptionally low Z score. As a result of falling sales and the burden of debt payments, not only does the company's financial situation become more difficult, but earnings per share also decrease. It is therefore recommended that the firm's leadership, rather than taking on additional debt, consider raising stock financing to attract investment capital, establish a target debt-to-equity ratio that does not impair the company's value, and adhere to that ratio. In addition, it was determined that the company's management employs ineffective procedures for administering trade receivables and inventory during the course of the investigation. The balance sheet should display a consistently high inventory figure, indicating a significant amount of finished goods, work-in-progress, and raw materials. According to these figures, it is possible that they sold a greater quantity of raw materials than finished goods. When there is an increase in the value of trade receivables on the balance sheet, it implies that customers owe the company a larger amount for goods or services that they have purchased on credit. In addition to the fact that the majority of the purchases were

not made with cash, a substantial number of individuals have not yet paid their credit card bills. This may impact the company's cash flow.

Conclusion:

By examining the current state of a company's finances, one can determine how well the company is performing. When making decisions regarding finances, the most crucial factor to consider is the consistency of the company's financial situation. The Z-Score model developed by Altman played a significant part in predicting that the company would go bankrupt in this scenario. The purpose of this study is to examine, predict, and assess the financial performance of India Cements Ltd. (a cement-producing company). The Altman Z score correctly represents the organization's financial health and any areas for concern. The research provides a solid understanding of the key financial facts, which is vital for evaluating the company's operational effectiveness.. The Z score of 0.717 places the company in a distress zone, which is an indication that it should be taken seriously. The management of India Cements Ltd. needs to start coming up with aggressive initiatives as soon as possible in order to bring the company back from its current state of depression.. Based on the findings, it has been determined that a significant quantity of both short-term and long-term debt for the organization is the root cause of a wide range of financial imbalances and hazards. In light of the significance of operational profit and working capital management, every company must make these two aspects of its organization a top priority. Keeping the ideal ratio in mind, it suggests making the most effective use of the assets and liabilities that are at your disposal. This is because a considerable number of businesses end up spending a significant amount of money on the repayment of their debt. Your ability to regulate your working capital will allow you to maintain control over your short-term debt as well as your operating expenses.

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