

Using Altman's 'Z' Score Model for Evaluating the Financial Health of Steel Authority of India Limited

Various tools are used for assessing financial performance of the companies by shareholders, government, bankers, creditors, financial institutions etc. They focus on the profitability and solvency position of the company. But the absolute figures in the financial statements do not serve this object. As there are many accounting tools like ratio analysis, decision theory etc. used for analysis but again they shows absolute result through which the present position can be judged not the future. Edward I Altman, Professor of Finance at New York University was the first person who developed a new model popularly known as "Z-score Model" to predict the financial health of the business concerns. He considered five ratios and assigned a weight for each ratio and produced a single number which indicates the financial health of the business concerns. In the present research paper an attempt has been made to predict the financial health of Steel authority of India Limited from 2004-2005 to 2013-2014 for ten years using Altman's Z-Score model. It is found out that SAIL is in too healthy Zone where it is successful in its financial performance and not to fall bankrupt.

Efficient financial management is necessary for success of any business. Effective financial management starts with raising the fund at most economical cost and ends with judicious and deliberate utilization of that fund. But continuous financial analysis of financial position is necessary to take corrective measures if any deviation occurs in the desired direction of the business concern. Z-score model is a business tool which is used to inform the financial health of a business concern. Iron and steel industry is very crucial for development of Indian economy. Steel is continues to be used in traditional sectors such as construction, housing and ground transportation, special steels are increasingly used in engineering industries such as power generation, petrochemicals and fertilisers. Steel Authority of India Limited (SAIL) is one of the largest state-owned steel making company based in New Delhi, India and one of the top steel makers in world. It is a public sector undertaking which trades publicly in the market is largely owned by Government of India and acts like an operating company.

Steel industry represents an integral part of Indian economy. Steel Authority of India Limited is one of the Maharatnas public sector undertakings. Since the company faces ups and downs over the period of time, the company have reported reduction in the profit, So that the present article is to establish a relevance to the present day problem.

The present study is analytical in nature and based on secondary sources of data. The data has been collected from various annual reports of Steel Authority of India Limited available on the official website of SAIL. The study is related with the analysis of financial health of SAIL. The period of the study is from 2005-06 to 2013-14. Altman's Z-score model has been used to analyse financial health of SAIL.

Altman (1968) used multiple discriminate analyses to find out a bankruptcy prediction model. He selected 33 publicly traded manufacturing bankrupt companies between 1946 and 1965 and

matched them to 33 firms on a random basis. The result yielded equations called Z-Score that correctly classified 94% of the bankrupt companies and 97% of the non bankrupt companies a year prior to bankruptcy. This percentage dropped when trying to predict bankruptcy two or more years before it occurred.

‘Z’ score model for measuring the bankruptcy

Edward I. Altman, a financial economist at New York University’s Graduate School of Business, developed a model for predicting the likelihood that a company would go bankrupt. This model uses five financial ratios that combine in a specific way to produce a single number, called the Z-score is a general measure of corporate financial health. The most famous failure prediction model is Altman’s Z-Score Model. Based on Multiple Discriminate Analysis (MDA), the model predicts a company’s financial health based on a discriminate function to the firm. The Z-score model, developed in 1968, was based on a sample composed of 66 manufacturing companies with 33 companies in each of two matched pair groups. Altman subsequently developed a revised Z-score model (with revised co-efficient and Z-score cutoffs) which dropped variables X_4 and X_5 (below) and replaced them with a new variable $X_4 = \text{net worth (Book value) / total liabilities}$. The X_5 variables were allegedly dropped to minimize potential industry effects related to assets turnover.

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

Where:

Z = Discriminate function score of a firm

‘Z’-score ingredients

The Z-score is calculated by multiplying the following accounting ratios, which is efficient in predicting bankruptcy.

X_1 (Working Capital/Total Assets)	This ratio expresses the liquidity position of the company towards the total capitalization. Working capital is defined as the difference between current assets and current liabilities. Liquidity and size characteristics are explicitly considered.
X_2 (Retained Earnings / Total Sales)	It indicates the amount reinvested, the earnings or losses, which reflects the extent of the company's leverage. In other words, the extent assets, which have paid by company profits
X_3 (Earnings before Interest and Taxes / Total Assets)	It is the measure of the company's operating performance and it also indicates the earning power of the company. In addition, this is a measure of the productivity of the firm's assets, independent of any tax on advantage factors. Since a firm's ultimate existence is based on the earning power of its assets, this ratio appears to be particularly appropriate for studies dealing with credit risk.
X_4 (Market Value of Equity / Book Value of Total liabilities)	It is the measure of the long term solvency of a company. It is reciprocal of the familiar debt-equity ratio. Equity is measured by the combined market value of all shares. While debt includes both, current and long-term liabilities, this measure shows how much assets of an enterprise can decline in value before the liabilities exceed the assets and the concern becomes insolvent.

X₅ (Sales / Total Assets)	This is a standard turnover measure. Unfortunately, it varies greatly from one industry to another. In addition to this, it will reveal the sales generating capacity of the company's assets and measure of management's capacity to deal with competitive conditions.
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Altman guidelines for health zone:

Situation	Z-Score	Zone	Remarks
I.	Below 1.8	Not Healthy	There is a high probability that the business will face financial distress in near future and the business may need desperate measures to survive in the market
II.	Between 1.8 and 2.99	Healthy	The firm falls in the gray area that means there is less probability that the firm will face financial distress in the near future.
III.	3.0 and above	Too Healthy	The business is financially sound and there is least probability that the firm will face financial distress

Data Analysis

Table No.1: Ratio of Net Working capital and Total assets

Year	Working Capital	Total Assets	X ₁
2004-05	7579	17920.75	0.42
2005-06	9276	18383.49	0.50
2006-07	13879	22906.33	0.61
2007-08	16879	27677.41	0.61
2008-09	22398	36855.04	0.61
2009-10	28081	51242.87	0.55
2010-11	24372	58726.03	0.42
2011-12	16206	76337.02	0.21
2012-13	14604	84218.46	0.17
2013-14	11679	91961.89	0.13
Mean			0.42

Source: Calculated from Company's Financial Reports

The above ratio indicates the level of liquid asset to the total capitalization of the company. From the table it is observed that the ratio percentage is in increasing trend until the year 2008-09 showing that the company has greater ability to meet the current obligations. But the ratio decreased considerably in last three years of the study.

Table No.2: Ratio of Retained Earning and total assets

Year	Retained Earning	Total Assets	X ₂
2004-05	5291.39	17920.75	0.30

2005-06	6919.53	18383.49	0.38
2006-07	11408.23	22906.33	0.50
2007-08	16561.27	27677.41	0.60
2008-09	20797.31	36855.04	0.56
2009-10	25508.87	51242.87	0.50
2010-11	28687.73	58726.03	0.49
2011-12	30810.08	76337.02	0.40
2012-13	31658.93	84218.46	0.38
2013-14	32997.55	91961.89	0.36
Mean			0.45

Source: Calculated from Company's Financial Reports

The ratio indicates the ability of the firm to earn profit and thereby securing retained earnings. Normally a firm has higher retained earnings, the firm will not starve for liquidity crunch and also the firm can reinvest in the appropriate venture at cheaper cost. The company SAIL maintains on an average of 45% of retained earnings to total assets indicating the company is in good position in terms of liquidity aspect as well as the exploitation of near opportunity for investment if any.

Table No.3: Ratio of Earning before interest & taxes and Total Assets

Year	EBIT	Total Assets	X₃
2004-05	9970	17920.75	0.56
2005-06	6174	18383.49	0.34
2006-07	9755	22906.33	0.43
2007-08	11720	27677.41	0.42
2008-09	9658	36855.04	0.26
2009-10	10534	51242.87	0.21
2010-11	7544	58726.03	0.13
2011-12	6091	76337.02	0.08
2012-13	4218	84218.46	0.05
2013-14	4192	91961.89	0.05
MEAN			0.25

Source: Calculated from Company's Financial Reports

Return on total assets indicates the ability of the firm to ensure earning capacity against its total assets. A firm's ability to earn is measured by the operating profit with which the firm enjoys over the period. Average profitability of SAIL has been 25% during the study period. Return on total assets was very good in 2004-05 i.e. 56%, it was good in years 2006-07 and 2007-08 but from 2008-09 to 2013-14 there has been a continuous drop in profitability of company.

Table No.4: Ratio of Market Value of Equity and Total Liabilities

Year	Equity Value	Total Liabilities	X₄
2004-05	26000.868	7614.1	3.41
2005-06	34344.276	5782.08	5.93
2006-07	46673.52	5593.18	8.34
2007-08	76309.14	4613.84	16.53

2008-09	39837.708	8896.04	4.48
2009-10	104313.252	17926.17	5.82
2010-11	70216.8	39013.52	1.80
2011-12	38847.63465	36525.7	1.06
2012-13	25753.85455	43193.82	0.60
2013-14	29491.9842	49295.54	0.60
MEAN			4.86

Source: Calculated from Company's Financial Reports

Equity to debt ratio indicates the proportion of owner's fund to the long term debt. The ideal ratio is 1:1. Where debt is more, the company has an obligation to pay interest to the creditors and thereby the shareholders risk may be increased. As far as SAIL is concerned, the companies have more equity capital rather than debt. Since the investment is in higher side, the companies have to rely on debt, so that the burden of debt will be more. In the initial stage, the SAIL have ample percentage of equity than debt, Ratio was highest in the year 2007-08, but in due course the ratio is eroded by way of adding more debt to its capital structure to meet their required investment.

Table No.5: Ratio of Sales and Total Assets

Year	Net Sales	Total Assets	X₅
2004-05	28523	17920.75	1.59
2005-06	27860	18383.49	1.51
2006-07	33923	22906.33	1.48
2007-08	39508	27677.41	1.43
2008-09	43204	36855.04	1.17
2009-10	40551	51242.87	0.79
2010-11	42719	58726.03	0.73
2011-12	45654	76337.02	0.60
2012-13	43961	84218.46	0.52
2013-14	46189	91961.89	0.50
MEAN			1.03

Source: Calculated from Company's Financial Reports

Total assets turnover ratio reveals the efficiency of the firm in utilizing its assets to convert into sales. The demand for the steel increases over the period of time, But the ratio shows a decreasing trend during the study period depicting that SAIL has not been able to convert its increase in the assets into the sales. The percentage of conversion stands at 103% for SAIL.

Table No.6: Z-Score of SAIL during the Study Period

S. No.	Year	Z-Score
1	2004-05	6.408
2	2005-06	7.322
3	2006-07	9.335
4	2007-08	14.339
5	2008-09	6.232
6	2009-10	6.335

7	2010-11	7.965
8	2011-12	2.312
9	2012-13	1.80
10	2013-14	1.685
MEAN		6.3714

Source: Calculated from Company's Financial Reports

Result and Findings of Study

From the year wise observation of Z-Score, SAIL was in excellent position from 2004-05 to 2010-11 while its position was good in the year 2011-12 but SAIL was in grey zone in the last year of the study. Overall performance of SAIL was very good during the study period as Average Z-Score from 2004-05 to 2013-14 stands at 6.3714.

Conclusion & Suggestions

According to the calculation shown above the Z-score of Steel Authority of India Limited stands at **6.3714** which is in the third categories i.e. 3.0 and above as depicted from the Altman's guidelines of bankruptcy. From this we can conclude the following major positive points,

1. The overall profitability during the study period (2004-05 to 2013-14) appears to be significant.
2. The financial health of the company is dwindling for the past 3 years.
3. There is no sign of failure of the business in near future.
4. Failure of the company in long-run is completely uncertain to predict.

To improve the financial health of the company it is necessary to consider following suggestions
The company should improve its Liquidity position so that company may not face any financial distress in the future.

The company should improve its earning capacity by improving operational efficiency.

The company should improve its equity-Debt ratio either by improving equity value or by decreasing some debt

Efforts should be made to increase sale with increase in the total assets.

Source: Paper by Mr. Asif Pervez

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