RESEARCH ARTICLE

ANALYSIS OF INDIAN IRON AND STEEL INDUSTRY USING ALTMAN'S Z-SCORE MODEL

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ABSTRACT

The present study tries to study and analyze the financial statement of the selected firms from bankruptcy perspective. This study is also expected to help the society in knowing how the available and scarce resources are efficiently utilized or otherwise by the industry players. The study has chosen to analyse the five year financial statements (2016-17 to 2020-21) of 10 companies' viz., Tata Steel Limited (TSL), JSW Steel Limited (JSWSL), Jindal Steel and Power Limited (JSPL), Steel Authority of India Limited (SAIL), Ratnamani Metals & Tubes, Prakash Industries Ltd, Hindalco Industries Ltd, Godawari Power and Ispat Ltd, APL Apollo Tubes Ltd, Hisar Metal Industries Ltd. The results from all the perspective were analysed found that even popular companies like Tata Steel Ltd, JSW Steel Ltd, Jindal Steel and Power Ltd, SAIL, Prakash Industries Ltd and Hindalco Industries Ltd shows that they fall under the distress zone, 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 if not taken measures to come out from the situation.

INTRODUCTION

The Indian steel industry has entered into a new development stage, post de-regulation, riding high on the resurgent economy and rising demand for steel. Rapid rise in production has resulted in India becoming the 2nd largest producer of crude steel during last four years (2018-2021), from its 3rd largest status in 2017. The country was also the largest producer of Sponge Iron or DRI in the world and the 2nd largest finished steel consumer in the world after China in 2021 (provisional), based on rankings released by the World Steel Association. In a de-regulated, liberalized economic/market scenario like India the Government's role is that of a facilitator which lays down the policy guidelines and establishes the institutional mechanism/structure for creating conducive environment for improving efficiency and performance of the steel sector. In this role, the Government has released the National Steel Policy 2017, which has laid down the broad roadmap for encouraging long term growth for the Indian steel industry, both on demand and supply sides, by 2030-31. The Government has also announced a policy for providing preference to domestically manufactured Iron & Steel products in Government procurement. The government has also approved a Production-linked Incentive (PLI) Scheme for Specialty Steel. It is expected that the specialty steel production will become 42 million tonnes by the end of 2026-27. This will ensure that approximately 2.5 lakh crores worth of specialty steel will be produced and consumed in the country which would otherwise have been imported.

Similarly, the export of specialty steel will become around 5.5 million tonnes as against the current 1.7 million tonnes of specialty steel getting FOREX of Rs 33,000 crore.

LITERATURE REVIEW

Anjum (2012), research paper speaks about the Business failure, regular changes that were undertaken in the Altman Z score model over the period from 1968 to 1993 and the comparison between various models developed in respect of bankruptcy. It states that the model is widely identified as the "predictor of bankruptcy". It states that Altman Z score model can safely be applied to the modern economy to predict bankruptcy two to three years before the bankruptcy case was revealed. Apoorva & Sneha Prasad (2019), on the basis of their study, by applying Altman Z score on 7 companies listed on the Bombay stock exchange, they concluded that the model is 85% accurate and effective for three years prior to the occurrence of the event of bankruptcy. They also suggested that the Altman Z score model could be widely used by the stakeholders of the company so that their financial interest remains protected. Bal and Raja (2013), studies the earnings management and techniques to predict solvency position. Their study uses Z-score to predict financial distress of IOCL and concludes that as per original Z-score the financial position of the company is not that much good. Though there are several studies has been made in this context, still may be very less studies have been made in Indian Context especially in case of FMCG Companies. The present study uses Z-score to predict the possibility

of bankruptcy in select Companies. C, S (2016), Altman Z score is a likely hood and not a prediction. From a company's financials, it may look likely that bankruptcy looms, but the management may well succeed in improving matters. The Z score is not intended to predict when a firm will actually file for legal bankruptcy; it is instead a measure of how closely a firm resembles other firms that have filed for bankruptcy i.e., it tries to assess the likelihood of economic bankruptcy. E.I. Altman (1968), from New York University in the late 1960"s. After this pioneering work, the multivariate approach to failure prediction spread worldwide among researchers in finance, banking, and credit risk. The Z-Score model has become a prototype for many of these internal-rate based models. Altman (1983, 1993) has suggested that the management of distressed firms can utilize the Z-Score model as a guide to a financial turnaround. Altman and McGough (1974), were the first to suggest the usefulness of bankruptcy prediction models for assessing going concern status. In a 1974 paper, they carried out a study the objective of which was to develop criteria to assist auditors identify situations where the status of a company as a going concern is in doubt by analysing the relationship between bankrupt companies and auditors" reports prior to bankruptcy. The study concluded that the judgment of the auditor must be the deciding factor on the appropriate going concern opinion and that the Z-Score model may be an effective aid to the auditor in forming his judgment.

Grice and Ingram (2001), analyse the generalizability of application of Z-score. The study finds negative results in application of Z-score in recent periods and to manufacturing firms, but positive results for predicting distress other than bankruptcy as it was originally developed for bankruptcy. Manoj Kumar and Madhu Anand (2013), on the basis of their study conducted on Kingfisher Airlines limited (KAL), they concluded that the performance of analysing financial health (and distress) of KAL using Altman's Z score is satisfactory. They observed that the company's financial health was consistently poor during the period of study i.e. from 2005 to 2012. Also, confirmed prediction of financial distress in a firm does not necessarily mean bankruptcy. It is only probability and situation indication likely future failure, which might get reversal also if proper steps are taken. McCarthy (2017), The main objective of his article was to find out whether the two forensic accounting tools that is the Altman Z score model and the Beneish M score model would predict the corporate failure and financial manipulation of Enron Corporation. The researcher of the said article has accomplished the objective of and has stated that both Altman Z score model and Beneish M score model should be used simultaneously for the purpose of audit. Mohammed, (2016), The article speaks about various techniques used for measuring financial health of a business firm but out of them Altman Z score is proved as a reliable tool. This article contains about a study conducted in a company raysut cement company and for this they had taken the financial data of the past 8 years and the study revealed the company and subsidiary companies are financially sound as their z score is higher than benchmark (2.99). This article concludes that Altman Z score can be used to stock holders for investing options and for managers to make financial decisions. Vandana Guptal (2014), important research studies having relevance to the present work have been reviewed under broad categories viz. studies on accounting models. The first set of accounting models were developed by Beaver (1966, 1968) and Altman (1968) to assess the distress risk for a corporate. Altman and Narayanan (1997) conducted studies in 22 countries where the major conclusion of the study was that the models based on accounting ratios (MDA, logistic regression, and probit models) can effectively predict default risk.

OBJECTIVES OF THE STUDY: The following are the objectives of the research paper.

- To study and examine the Altman's five key performance ratios of selected steel companies of India.
- To comprehend the concept of Z Score Model and bankruptcy in India.

- To analyse the impact of the components of Altman's Z-Score on the Altman's Z-Score of selected steel companies.

TOOLS EMPLOYED: There are several analytical models existing for predicting bankruptcy but Altman Z score model is considered to be the most accurate and appropriate. Altman was the first one to develop a statistical tool which is able to predict the bankruptcy up to an extent of 95% a year prior to their downfall. Therefore, to achieve the objectives of the study, the model used in this research have been well chosen according to the need and their ability for exact or the best approximate prediction. The model used is Altman Z Score for predicting the financial distress position of the companies under study. It is a multivariate discriminate analysis (MDA), which uses the financial statements for calculating the values necessary for accurate forecasting.

The Z-score model: The Z-score model was introduced as a way of predicting the probability that a company would collapse in the next two years. The model proved to be an accurate method for predicting bankruptcy on several occasions. According to studies, the model showed an accuracy of 72% in predicting bankruptcy two years before it occurred, and it returned a false positive of 6%. The false-positive level was lower compared to the 15% to 20% false-positive returned when the model was used to predict bankruptcy one year before it occurred. When creating the Z-score model, Altman used a weighting system alongside other ratios that predicted the chances of a company going bankrupt. In total, Altman created three different Z-scores for different types of businesses. The original model was released in 1968, and it was specifically designed for public manufacturing companies with assets in excess of $1 million. The original model excluded private companies and non-manufacturing companies with assets less than $1 million.

Later in 1983, Altman developed two other models for use with smaller private manufacturing companies. Model A Z-score was developed specifically for private manufacturing companies, while Model B was created for non-publicly traded companies. The 1983 Z-score models comprised varied weighting, predictability scoring systems, and variables.

The Altman's Z-score formula is written as follows:

Altman's Z-Score = $1.2*X1 + 1.4*X2 + 3.3*X3 + 0.6X4 + 0.999*X5$
Where:

X1 is the Working Capital/Total Assets ratio.
X2 is the Retained Earnings/Total Assets ratio.
X3 is the Earnings Before Interest and Tax/Total Assets ratio.
X4 is the Market Value of Equity/Total Liabilities ratio.
X5 is the Total Sales/Total Assets ratio.
What Altman's z score mean?

Usually, the lower the Z-score, the higher the odds that a company is heading for bankruptcy. A Z-score that is lower than 1.8 means that the company is in financial distress and with a high probability of going bankrupt. On the other hand, a score of 3 and above means that the company is in a safe zone and is unlikely to file for bankruptcy. A score of between 1.8 and 3 means that the company is in a grey area and with a moderate chance of filing for bankruptcy. Investors use Altman's Z-score to make a decision on whether to buy or sell a company's stock, depending on the assessed financial strength. If a company shows a Z-score closer to 3, investors may consider purchasing the company's stock since there is minimal risk of the business going bankrupt in the next two years. However, if a company shows a Z-score closer to 1.8, the investors may consider selling the company's stock to avoid losing their investments since the score implies a high probability of going bankrupt.

THE FIVE FINANCIAL RATIOS IN Z SCORE:

The following are the key financial ratios that make up the Z-score model:

1. $\dfrac{\text{Working Capital}}{\text{Total Assets}}$

The value of a company's working capital determines its short-term financial health. A positive working capital means that a company can meet its short-term financial obligations and still make funds available to invest and grow. In contrast, negative working capital means that a company will struggle to meet its short-term financial obligations because there are inadequate current assets.

2. $\dfrac{\text{Retained Earnings}}{\text{Total Assets}}$

The retained earnings/total assets ratio shows the amount of retained earnings or losses in a company. If a company reports low retained earnings to total assets ratio, it means that it is financing its expenditure using borrowed funds rather than funds from its retained earnings. It increases the probability of a company going bankrupt.

On the other hand, high retained earnings to total assets ratio shows that a company uses its retained earnings to fund capital expenditure. It shows that the company achieved profitability over the years, and it does not need to rely on borrowings.

3. $\dfrac{\text{Earnings Before Interest And Tax}}{\text{Total Assets}}$

This ratio is a measure of the true productivity of the firm's assets, independent of any tax or leverage 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 corporate failure. Furthermore, insolvency in a bankrupt sense occurs when the total liabilities exceed a fair valuation of the firm's assets with value determined by the earning power of the assets. As we will show, this ratio continually outperforms other profitability measures, including cash flow.

4. $\dfrac{\text{Market Value Of Equity}}{\text{Total Liabilities}}$

The market value of the equity/total liabilities ratio shows the degree to which a company's market value would decline when it declares bankruptcy before the value of liabilities exceeds the value of assets on the balance sheet. A high market value of equity to total liabilities ratio can be interpreted to mean high investor confidence in the company's financial strength.

5. $\dfrac{\text{Net Sales}}{\text{Total Aseets}}$

The sales to total assets ratio show how efficiently the management uses assets to generate revenues. A high sale to total assets ratio is translated to mean that the management requires a small investment to generate sales, which increases the overall profitability of the company.

Z-Score Analysis for Tata Steel Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
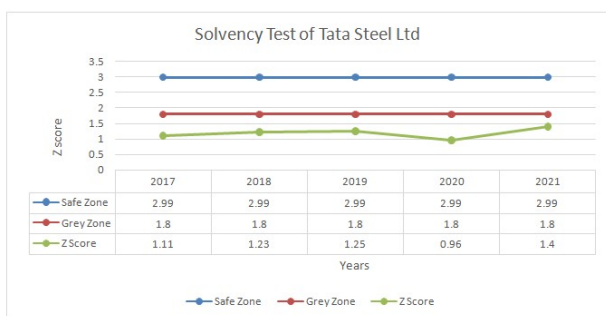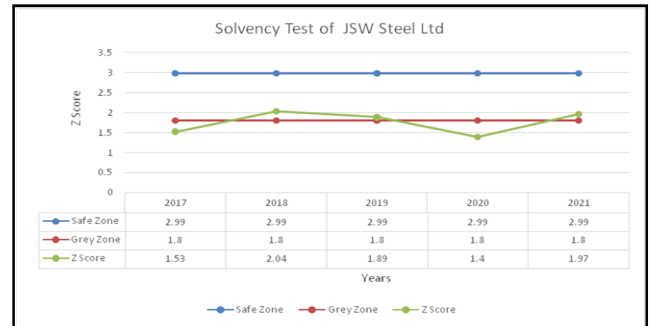
Chart 1. Z- Score Analysis for Tata Steel Ltd

Chart 1shows that, Tata Steel Ltd falls under the distress zone as per the Z score value. According to the fig 2, it can be understood that, the company has not even crossed the grey zone line over the last five years. This shows that the company has chance to go insolvent in the near future. Tata Steel which is considered one of the oldest companies in the industry and is a strong competitor to each of the company both in and outside the industry is also in the distress zone. Tata steel experienced some disruptions in its operation in the FY 2020 but soon they stabilised by FY 2021.The working capital to total assets ratio is negative which depicts that company's liquidity position is not good. There is a steady growth in the retained earnings to total assets ratio except in the FY 2021. The Earnings before interest and tax to total assets ratio shows disruptions in the FY 2020. The market capitalisation to total liabilities shows the negative trend from the FY 2018-2020.

Z-Score Analysis for JSW Steel Ltd: Chart 2: Z-Score Analysis for JSW Steel Ltd

This ratio tells you the amount of equity the company has relative to the assets the company owns. The sales to total assets ratio do not show much fluctuations. As shown in table 4.2 and chart 4.2, we see that "JSW Steel Ltd" falls under distress zone. This depicts that the company has crossed the distress zone and is not in danger but still it is not safe. The company was in grey zone in the FY 2018, 2019 and 2021. The company's liquidity position is not good. The retained earnings to total assets ratio of the company shows the downward trend, it means that it is financing its expenditure using borrowed funds rather than funds from its retained earnings. It increases the probability of a company going bankrupt. The EBIT to total assets ratio shows a steady growth except in the FY 2020, A high ratio indicates the company can utilize its assets to generate profits. The market capitalisation to total liabilities ratio shows positive growth in the FY 2017, 2018, 2019 and 2021. The net sales to total assets ratio shows declining trend in the FY 2020 and 2021.

Z-Score Analysis for Jindal Steel and Power: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).

Z Score Analysis for Jindal Steel and Power

From the above chart we find that "Jindal Steel and Power" falls under distress zone. There is a high probability that the business will face financial distress in near future and the business many need desperate measures to survive in the market.
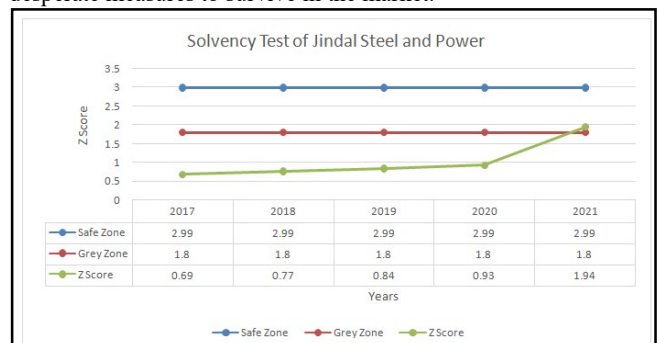
Chart 3. Z Score Analysis for Jindal Steel and Power

After years of efforts, Jindal steel managed to sustain the company and now it has started to grow. The Z score of the company shows a growing tendency in the financial years, which is good sign. The FY 2021 shows that the company is in grey zone. The liquidity of the company is not satisfactory as it shows negative liquidity position. The profitability of the company is good in the FY 2021 as compared to the rest past years. The EBIT to total assets ratio shows dissatisfactory results leading to bankruptcy situation. The market capitalisation to total liabilities shows a good improvement in the FY 2020 and 2021. The fluctuations in the net sales to total assets are minimal.

Z Score Analysis for SAIL: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years
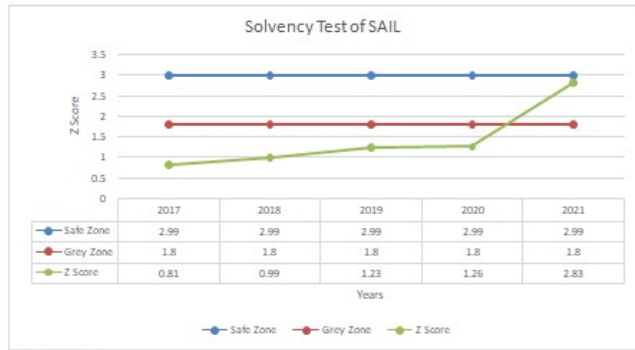
(2017-2021).

Chart 4. Z Score Analysis for SAIL

From the above chart we find that "Steel Authority of India Limited (SAIL)" falls under distress zone, Distress zone is a hight probability that the business will face financial distress in near future and the business may need desperate measures to survive in the market. The good part is the company shows the increasing trend in the Altman z score over the period. The company is near to safe zone in the FY 2021. The liquidity position is not up to mark over the period which shows that total assets are not good enough to cover the current liabilities; therefore, the company's liquidity is in danger. Retained earnings to total assets does not show much fluctuations. The company shows increasing trend in respect with EBIT over the years. The company's market capitalisation to total assets shows the downward sloping line from the FY 2018-2020, which affects the company's survival. The activity ratio shows the increasing trend except in the FY 2020.

Z Score Analysis for Ratnamani Metals and Tubes Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
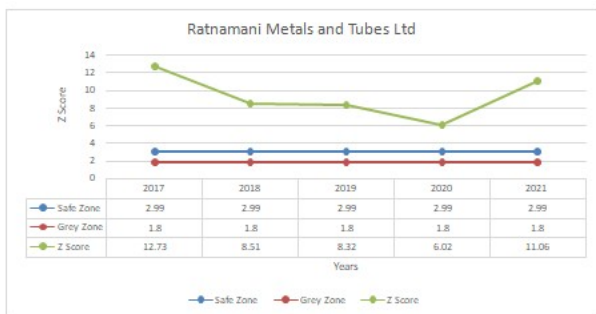

Chart 5. Z Score Analysis for Ratnamani Metals and Tubes Ltd.

From the above chart we find that "Ratnamani Metals and Tubes Ltd" falls under the safe zone which means the business is financially sound and there is least probability that the firm will face financial distress. Now the company is completely free from any danger or risk of insolvency.

The liquidity position of the company shows the downward trend which shows that total assets are not enough to cover the current liabilities therefore leading the company's liquidity in danger. The retained earnings to total assets ratio show the good growing trend over the years. Ebit to total assets ratios does not depicts much differences. The net sales to total assets shows decreasing trend from the FY 2017-2020, lower the ratio, the company finds in danger as it is not able to make appropriate use of its assets for generating sales. The z scores are in safe zone but they show the diminishing trend over the period.

Z Score Analysis for Prakash Industries Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
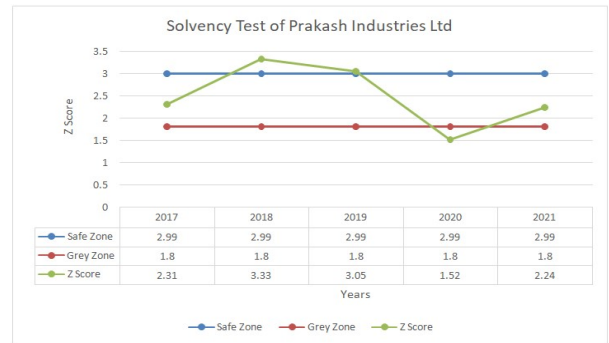

Chart 6. Z Score Analysis for Prakash Industries Ltd

From the above chart we find that "Prakash Industries Ltd" falls under grey zone, that means there is less probability that the firm will face financial distress in the near future. In the FY 2018 and 2019 the company was in safe zone depicting the business is financially sound and there is least probability that the firm will face financial distress. Retained earnings to total assets ratio shows improvements over the years. More fluctuations are found in market capitalisation to total liabilities ratio, A high market value of equity to total liabilities ratio can be interpreted to mean high investor confidence in the company's financial strength.

Z Score Analysis for Hindalco Industries Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
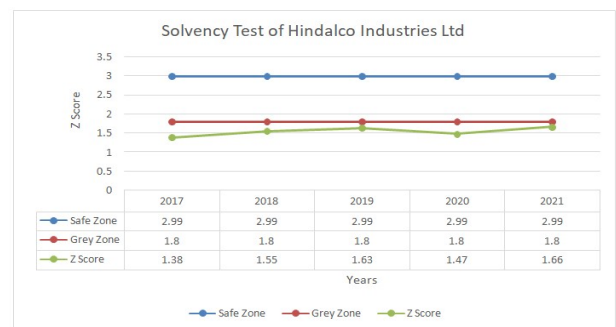

Chart 7. Z Score Analysis for Hindalco Industries Ltd.

From the above chart 5 we find that "Hindalco Industries Ltd" falls under the distress zone, 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. The retained earnings to total assets ratio show the improvements in the trend i.e., increase from 0.0306 to 0.0991. The other variables show moderate fluctuations of ratios leading to bankruptcy position. which proves that its assets would not support for long and it might have to file for bankruptcy.

The company is deteriorating at a fast pace. The market capitalisation to total liabilities ratio shows steady declining trend except in the FY 2021.

Z Score Analysis for Godawari Power and Ispat Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
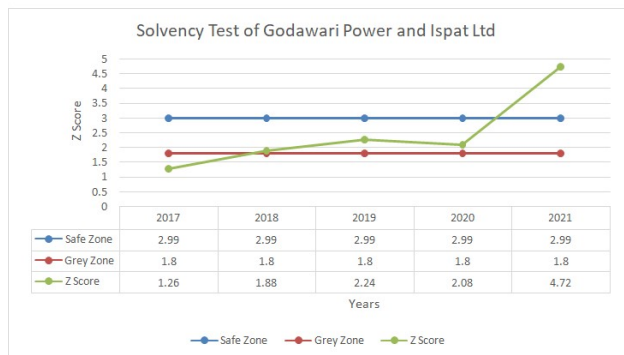

Chart 8. Z Score Analysis for Godawari Power and Ispat Ltd.

From the above chart 6 we find that "Godawari Power and Ispat Ltd" falls under grey zone, if firm falls in the grey area that means there is less probability that the firm will face financial distress in the near future. The Altman z score for the FY 2021 shows that the company is in safe zone, explaining the financial soundness of the company. The liquidity position of the firm shows good growing trend over the years. The higher the ratio, it's better for the company as they will have high liquidity and will be in a safer position as compared to the ones with low ratio. The retained earnings to total assets ratio also show a positive growth, The more the ratio, it shows the company's higher dependency on borrowings for funding their resources. If it has a high ratio, then the company funds a large part of its resources through retained earnings. The market value of equity to total liabilities ratio shows decreasing trend.

Z Score Analysis for APL Apollo Tubes Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
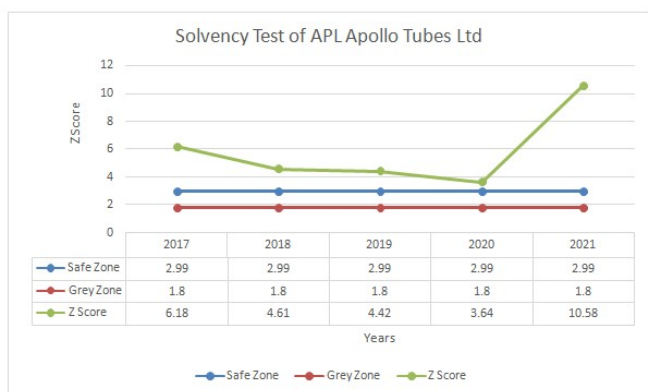
Chart 9. Z Score Analysis for APL Apollo Tubes Ltd.

From the above Chart 6 we find that "APL Apollo Tubes Ltd" falls under the safe zone, the business is financially sound and there is least probability that the firm will face financial distress. Overall health of the firm is satisfactory. There is decreasing trend in z scores over the FY 2017-220. There is a downfall in liquidity position of the firm. We see distorting tendencies in market capitalisation to total liabilities ratio from the FY 2018-2020. An increasing sale to total assets ratio is seen over the years except 2021, The higher the ratio, the better it is for the company and shows a more stable nature. Ebit to total assets does not show much fluctuations.

Z Score Analysis for Hisar Metal Industries Ltd: The following graph provide the calculated components of Altman Z score model and the change in the Z score value over the period of last five years (2017-2021).
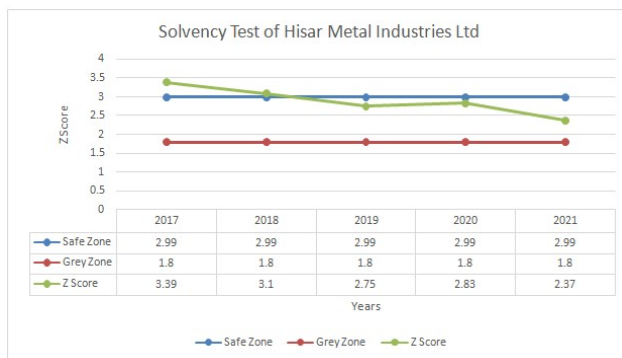

Chart 10. Z Score Analysis for Hisar Metal Industries Ltd.

From the above table 4.10 we find that "Hisar Metal Industries Ltd" falls under the grey zone, the firm falls in the grey area that means there is less probability that the firm will face financial distress in the near future. In the FY 2017 and 2018 we see that the company was in safe zone depicting the sound financial health. There is decreasing trend in the market capitalisation to total liabilities ratio from 4.6735 to 1.0548. the liquidity position of the firm is seen improving over the years. There is increasing trend in retained earnings to total assets ratio, the more the ratio it shows the company's higher dependency on borrowings for funding their resources. If it has a high ratio, then the company funds a large part of its resources through retained earnings.

FINDINGS OF THE STUDY:

The Iron and Steel industry in India is one of the core industries, which wheels of Indian economy towards growth trajectory. The industry, being the significant contributor to the nation building touches the lives of the common man in one way or the other every day. Hence, the growth and development of this industry is of paramount importance to all its stakeholders, particularly the policy makers. In this connection, its growth and development over the years can be tracked by various means. One of them is by analysing the bankruptcy position the firms. Following are findings of the study:

1. It is found that the Prakash Industries Ltd and APL Apollo Tubes Ltd fall under the safe zone depicting the business is financially sound and there is least probability that the firm will face financial distress.
2. We see that Godawari Power and Ispat Ltd and Hisar Metal Industries Ltd falls under the grey zone that means there is less probability that the firm will face financial distress in the near future. We also found it interesting that popular companies like Tata Steel Ltd, JSW Steel Ltd, Jindal Steel and Power Ltd, SAIL, Prakash Industries Ltd and Hindalco Industries Ltd shows that they fall under the distress zone, 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.

SUGGESTIONS

The Z Score is not intended to predict when a firm will actually file for legal bankruptcy. It is instead a measure of how closely a firm resembles other firms that have filed for bankruptcy, i.e., it tries to assess the likelihood of economic bankruptcy. In this study we have tested that how we can use Altman Z score method to check the financial soundness of the company and if company comes in grey zone, then management needs to take corrective actions. This study investigated that most of the firms are in Distress Zone which clearly indicates that these firms may go Bankrupt in near future. It's up to top level management to design effective strategies for better control & management of resources. This may result in win-win situation for both management & investors. Finally, we can conclude that

Altman's model still exists and used by the companies for measuring creditworthiness of the companies and it still remains promising but challenging.

CONCLUSION

The study talks about the financial health of the sample companies belonging to the steel industry. The application of Altman Z score reveals the true position of the companies and also give a glimpse of the areas of default for each company. But, along with the financial aspects there are certain qualitative aspects connected which also have an influence of the financial health of the company. The study gives insights on the financial information, judgements about the company's performance and is an alarm for the companies which are found to be in distress zone according to the Z score analysis. Based on the solvency test, each company's management can take charge and design strategies specific for its use so as to build-up the business which somehow had taken a downturn. Certain patterns can be formed from the financial ratios of the distinct companies, which helped in gaining knowledge on the aspects which needs improvement for fostering growth in the company and the industry as a whole. According to the findings, we can conclude that a large amount of debt both short term and long term causes several imbalances in the company's financial and puts the future in jeopardy. Working capital management is a vital area on which each and every company should focus. It refers to efficiently making use of the current assets and current liabilities and striking the right balance between the two. It is done so because many

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