Original Research Article

Bankruptcy Prediction for Cement Industry in India Using Altman Z Score Model

Abstract

This study is to throw a light on the financial performance of selected companies. It is based on Altman's Z score model particularly for investigation of financial soundness. It shows that most of the companies are not with good financial health. To improve the business performance of industry, financial soundness of the companies should be maintained appropriately. Moreover, to improve the financial performance technological & managerial up- gradation is required. The general purpose of the study was to use Altman's Z-score model in predicting corporate failure of financially distressed companies. So, in this study we are considering selected ten cement companies for the period of five years, and analyzing their bankruptcy prediction. By using Altman's formula, we are calculating various factors that affect the company's financial health.

Keywords: Altman's Z- Score, Bankruptcy, Cement Industry, Financial ratios and India.

INTRODUCTION

It is the goal of any business to increase profits. As a result, it's essential that the organization has a secure financial footing. The purpose of a company's financial statements is to enable for an assessment of the company's financial health by providing basic facts on the company's financial performance and condition. It is often important to undertake a survey of such monetary activity and monetary scenario in order to be aware of and in charge of the presentation and position. Analysis of a company's finances may tell you a lot about how stable and successful it will be in the future. In-depth financial study of a firm may provide insight into the company's prospects for success or failure. The report details the fiscal successes and failures of the company. By illuminating and strengthening connections between the various parts of financial statements, financial evaluation primarily serves to facilitate the accomplishment of our company's goal.

Edward Altman developed the "Z" score. Using math, we can predict that 1968 will be a financially disappointing year. At first, it was shown that the Altman Z Score could accurately predict bankruptcy two years in advance, with an accuracy of 72%. Prof. Altman from New York University looked at 66 companies, of which 50% had previously declared bankruptcy between 1946 and 1965. He analyzed them using 22 indicators, classifying them into five groups according to their fluidity, dissolve-ability, impact, productivity, and mobility. As time progressed, so did the accuracy of the Altman Z Score. From 1969-1975, 1976-1995, and 1996-1995, a total of 86, 110, and 120 companies were researched. Altman's Z-score accuracy ranged between 82% and 94%. Strategy analyst Graham Secker of Morgan Stanley recently (2009) used a system known as the "Z Score" to assess a group of European companies. More than two-thirds of the time, he discovered, the firms with the worst financial statements underperformed the market.

India produces about as much cement as China. Competition from China has been difficult for it. China is making good use of its huge economy and cutting-edge technology. In order to compete with this global behemoth, the Indian cement industry must first stabilize its finances and then upgrade its technology. In order to keep up with the rest of the world, we need to keep an eye on the state of the cement industry in our area financially. This is where the potential for both consumption and production is at its peak. This study will help us determine our strengths and weaknesses so that we can better track and assess the steel industry's performance in real time. In the long term, this will allow us to improve the industry financially and technologically. As is customary for such an investigation, we will be examining the company's financial documents to learn more about their status. When we are through, we will have a better idea of the company's current and future market standing. This research will aid businesses in the long run by allowing them to adjust their strategy to better align with their long-term objectives.

LITERATURE REVIEW

Organizational collapse may be broken down into five stages (Fitzpatrick, 1932): When a company discovers its financial woes in its early stages, when it is still developing its capacity for profitability, the results might be embarrassing. When a company cannot get the money, it needs to pay its bills, it is said to be financially insolvent. Complete financial insolvency occurs when a business's debts are greater than its assets. The bankruptcy of a company is considered "confirmed" when measures are taken to safeguard creditors and liquidation begins. Because of limitations in prior univariate studies, Altman developed the multiple discriminant analysis technique. However, the image of the company's financial health painted by its ratios is often misleading. New York University's Professor Edward Altman developed a more methodical approach to this problem by isolating the relevance of five important ratios of various aspects of a company's success. Altman's Z-score is widely used in the banking industry and is well-liked by creditors, investors, and rating agencies.

Working capital and cash flow are the most important aspects of a model for forecasting insolvency (Ramakrishna, 1982). Since the selected bankruptcy prediction model could only predict bankruptcy one year into the future, he concluded that it was more accurate. Therefore, management, lenders, and restructuring agencies should consider it crucial. Sample divided the units into two categories: the thriving businesses and the failing enterprises (Katariya, 1995). Then he compared the two groups' financial data from the preceding five years. To evaluate its performance, he used 54 financial measures and 8 macroeconomic indices. Linear discriminant analysis was used in two distinct parts of the study. While the first part relied only on financial measurements, the second half took into account the impact of macroeconomic variables. Macroeconomic considerations were shown to have the least impact on the discriminant function.

In order to evaluate industrial disease using multiple discriminant analysis (Rekha and Pai, 2006), they studied data from 38 healthy and 34 unwell units and selected the example companies without regard to their size or field. Multiple discriminant analyses, the research finds, may better predict occupational sickness. Manoharan Kannadhasan, (2007), study endeavors to answer the question, "Why do companies today need to outperform their rivals?" Managing the company's finances with extreme precision is essential to its long-term health and growth. Determine the likelihood of financial trouble for each DSE share, used the Z scoring model (Chowdhury and Barua, 2009). Z-score was calculated using information

gathered from 53 different companies between 2000 and 2005. Although it may not be totally applicable to firms in Bangladesh, they claim that Altman's Z score model demonstrates significant validity and accuracy in foreseeing the distressing scenario of the Z category organizations.

The use of Z-score models to anticipate insolvencies as far out as three years in the future (Gerantonis Vergos and Christopoulos, 2009). It was clear from the results that the Altman model was effective in predicting future breakdowns. The group concluded that the results might be used by company management for stock selection, by regulatory authorities for financing choices, and by professional investors for stock selection. With the Z score technique, (Rajaratnam and Jayaraman, 2010) assessed the financial health of the Indian steel sector. The data used in this research was gathered over a five-year period (2006-2010) from five separate firms in the steel industry. Their research indicates that all of the selected businesses are solvent throughout the time frame of the study. Altman and Kida models to report on the usefulness of financial measures in predicting bankruptcy among Jordanian listed firms (Khalid Alkhatib and Ahmad Eqab Al Bzour, 2011). Non-financial service and manufacturing firms from the years 1990-2006 make up the sample utilized here.

MMTC, has a solid possibility of recruiting investors and a sound financial footing in general, so it's a reasonable bet to join them (Kumari, 2013). The research will analyze the financial health of the cement sector in Bangladesh. The research indicates that two of the five firms have strong financial footing since their Z ratings are greater than the mean for their respective industries (Mizan and Hossain’s, 2014). Even when the company's finances are sound, special attention must be paid to the management in order to enhance the company's financial condition. Both of the other companies are certain to fail financially. Based on its strengths and weaknesses, investment characteristics, economic health, and other tendencies, a company's viability may be judged; this study investigates the financial ratios used to analyze financial data in order to do just that (Sarika Lohana, 2014). Business performance, expansion, profitability, and liquidity may all be assessed by using ratio analysis. An accurate picture of a business's financial health cannot be gleaned from a single ratio calculation.

Using Z-score analysis, looked at how stable the Indian supply chain was financially Vikas (Tyagi, 2014). The average Z score increased from 2.54 in 2006, before the global crisis, to 3.01 in 2010, after the recession had hit India's economy, demonstrating the industry's vitality and growth. This data points to a successful year for the Indian logistics industry. To predict financial difficulty among chosen FMCG companies for certain fast-moving consumer goods (FMCG) companies, applied Altman's Z-score to forecast whether or not they would go bankrupt (Vishwavidyalaya, C.G, 2015). Specifically, this study focuses on five FMCG (fast-moving consumer goods) companies (2011 to 2015). Investors in this model may use the Z-score and other measures of solvency to assess the financial health of enterprises, according to the study's findings. Analyzing the most recent financial data, the score attempts to foretell the likelihood of bankruptcy for a certain company (Sanesh, 2016). (Arun Vadyak, 2017), examine the financial health and overall financial performance of selected steel manufacturers. In the study, the Z-score concept is introduced, along with its practical use on financial measurements to evaluate company success, all of which is shown graphically. The author is doing this research out of personal curiosity.

RESEARCH METHODOLOGY

Objectives of the study

- To evaluate the financial performance of selected cement companies in India using Altman's Z score model.
- To determine the bankruptcy status of the cement industry in terms of Altman Z score model.

The study's findings will provide light on the monetary data. This question is, therefore, a quantitative one. The awareness about the applicability of Altman's Z-score in Indian context is very low. Hence, not much literature is available. Therefore, an exploratory research approach has been followed. The study is purely based upon the secondary data available and obtained from the financial statements of the company. Sampling design is non-Probability sampling, sampling technique is Convenience sampling, Sample size is 10 cement companies, area of study is cement industry in India, and data analysis method used is Altman Z score model. Following are selected cement companies for the study.

Altman Z-score Model

Altman Z-Score = 1.2*X1 + 1.4*X2 + 3.3*X3 + 0.6*X4 + 1.0*X5

Where, X1 = Working Capital / Total Assets
This ratio is used as a proxy for how liquid an organization's assets are. Companies in distress typically see a decline in liquidity.
X2 = Retained Earnings / Total Assets
The profitability of a business is measured by this ratio. An alarming trend is a decreasing profit margin.
X3 = Earnings before Interest and Taxes / Total Assets
The higher this ratio, the more lucrative a company is relative to its size.
X4 = Market Capitalization / Total Liabilities
This percentage indicates how low an organization's assets may fall before the firm is formally declared bankrupt (i.e., its liabilities become higher than its assets).
X5 = Sales / Total Assets
To determine how well a company turns its assets into profits, analysts look at the asset turnover ratio.
This ratio applies only to companies engaged in manufacturing or those are publicly listed. Modifications to the aforementioned ratio are shown here.

For Private companies – U.S Formula-
Z1 = .717*X1 + .847*X2 + 3.107*X3 + .42*X4 + .998*X5
T4 = Book Equity / Total Debts in the aforementioned calculation.

For non-manufacturing companies – U.S Formula-
Z2 = 6.56*X1 + 3.26*X2 + 6.72*X3 + 1.05*X4

The ratio does not include organizations with substantial debt loads, such as banks, financial corporations, and energy and utility providers.

For Private Non-Manufacturing companies – Other countries Formula-
Z3 = 6.56*X1 + 3.26*X2 + 6.72*X3 + 1.05*X4A + 3.25

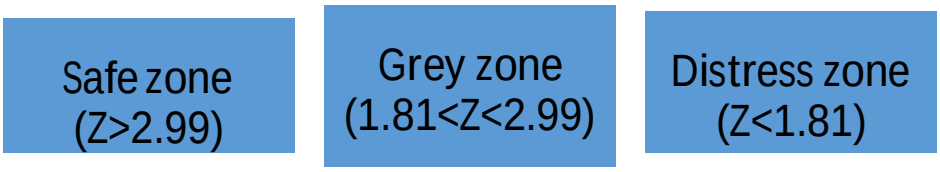

Figure 1: Z score

Researchers in India looked at the bankruptcy rates of 10 different cement businesses. In terms of scope, they might be extremely wide to limited. The information covers a period of 5 years and was gathered from the annual reports (financial report) of the designated businesses (i.e. for 2022, 2021, 2020, 2019 and 2018). Many factors were considered when deciding which organizations to include in this analysis. These factors included past performance, market capitalization, number of years in business, and the accessibility of relevant data. On NSE and BSE, you can find over 50 cement companies. Cement firms of all sizes are included in this category. These establishments are expectedto set an example for the rest of society and improve people's lives. A sample of the companies that have been investigated according to these standards are included as follows

S. No	Name of the Companies
1	Ambuja Cement
2	Associated Cement Companies (ACC)
3	J.K. Cement
4	Shree Cement
5	UltraTech Cement
6	India Cements
7	Dalmia Bharat cement
8	JK Laxmi cement
9	Star cement
10	Sagar Cement

DATA ANALYSIS

The Altman Z Score model's components and the derived Z score value's variation is shown in the following tables (covering the years 2018-2022).

Table 1: Z score analysis for Ambuja cement

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	0.056	0.08	0.089	-0.004	0.05
X2= R.E/ Total assets	0.795	0.818	0.807	0.781	0.774
X3= EBIT/ Total assets	0.065	0.059	0.072	0.094	0.098
X4= Market cap. / Total liabilities	4.291	5.033	4.64	4.031	3.722
X5= Net sales/ Total assets	0.439	0.465	0.448	0.46	0.505
Z Score	4.411	4.925	4.708	4.281	4.209
Average Z score			4.55		

(Source: Authors' calculations)

As can be seen in Table 1, Ambuja Cement Industries has a z-score greater than 2.990, putting it far outside of danger territory. Possible causes include a high net sale to operating profit ratio. From FY 2018 onwards, we can observe an upward trend in net sales, from an initial value of 0.439 in FY 2018 to a projected 0.505 in FY 2022. In FY 2020, it dropped to roughly 0.448, but they managed to reverse that trend the next year. The z-score was lowered

from 4.925 to 4.708 in FY 2019, and it will drop even lower to 4.281 in FY 2021. The company's financial outlook is bright, with an average z value of 4.55 for the fiscal years 2018 through 2022.

Table 2: Z score analysis for ACC

Particular	2017	2018	2019	2020	2021
X1= W.C/ Total assets	0.052	0.117	0.16	0.195	0.203
X2= R.E/ Total assets	0.061	0.094	0.079	0.078	0.087
X3= EBIT/ Total assets	0.087	0.093	0.118	0.093	0.117
X4= Market cap. / Total liabilities	1.69	1.91	2.08	2.31	2.216
X5= Net sales/ Total assets	0.091	0.932	0.934	0.771	0.781
Z Score	2.35	2.65	2.87	2.8	2.86
Average Z score			2.706		

(Source: Authors' calculations)

From the Table 2, ACC Cement Industries has been financially stable over FY2017– FY2021 and has emerged from the "grey zone" into the "safe zone". Z-score for ACC Cement Industries dropped from 2.80 in FY2020 to 2.80 in FY2021; however, it has since recovered and is currently very near to the safety zone at 2.86. From 2020 on, operating profit as a percentage of total assets dropped from 0.118 in 2015 to 0.093 in 2020. The ratio of net sales to total assets also fell, from 2.87 to 2.80, in FY 2020. In addition, the company's consistent z-score suggests that it is doing well financially. The firm's finances will be safe if management is able to reduce debt and expand resources via reinvestment of profits. They were in the middle ground, but that didn't mean they weren't worried about how a crisis may affect them. Now that they've come out on the other side, they're ready to take on any project, no matter how big or how challenging, without worrying about going bankrupt again.

Table 3: Z score analysis for J.K. cement

Particular	2014	2015	2016	2017	2018
X1= W.C/ Total assets	-0.083	-0.019	-0.112	-0.103	-0.07
X2= R.E/ Total assets	0.149	0.139	0.145	0.17	0.209
X3= EBIT/ Total assets	0.093	0.088	0.049	0.108	0.127
X4= Market cap. /Total liabilities	0.567	0.441	0.615	0.796	1.203
X5= Net sales/ Total assets	0.662	0.615	0.511	0.703	0.774
Z Score	1.42	1.341	1.11	1.654	2.125
Average Z score			1.53		

(Source: Authors' calculations)

It is observed from Table 3 that, J.K. Cement is experiencing a slump. This illustrates how dangerous the situation has become for the company. After many years of effort, J.K. Cement has reached a stable state and is now growing. There has been an increase in both revenue and profit for the business over the last two years. While the Working capital to total assets ratio improved from FY 2021-22's -0.103 to -0.070, it is still negative and might be a contributing factor in the company's current predicament. After falling to 1.110 at the end of FY 2020, the Z score rebounded during FY 2020-21, increasing to 1.654 and then leaping to a high of 2.125 by the end of FY 2021. In this case, the company as a whole had an average Z-score of 1.530 across the span of analysis. The ratio of retained earnings to total assets increased from 0.170 to 0.209 as a result of the company's expansion, and similar trends were

seen across a range of other financial indicators.

Table 4: Z score analysis for Shree cement

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	0.18	0.132	0.156	0.175	0.134
X2= R.E/ Total assets	0.091	0.062	0.081	0.109	0.102
X3= EBIT/ Total assets	0.121	0.071	0.101	0.143	0.125
X4= Market cap. /Total liabilities	1.424	1.715	2.92	2.634	2.81
X5= Net sales/ Total assets	0.675	0.787	0.629	0.62	0.633
Z Score	2.27	3.02	3.01	3.03	3.03
Average Z score			2.87		

(Source: Authors' calculations)

Shree Cements' z-score started the fiscal year around the median, as shown in Table 4, and it has been progressively increasing since then, as the company's net sales were low in FY2018-2019, but they worked hard to improve their status and emerged from the "safe zone" in FY2019. The EBIT ratio decreases somewhat in 2019, but then steadily improves in the years that follow. The improvement in the company's Z-score from 2.27 to 3.02 indicates that shareholders may feel confident in the company's future prospects and financial stability.

Table 5: Z score analysis for UltraTech cement

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	-0.009	-0.027	-0.007	0.042	0.002
X2= R.E/ Total assets	0.041	0.035	0.076	0.066	0.087
X3= EBIT/ Total assets	0.061	0.05	0.072	0.098	0.103
X4= Market cap./Total liabilities	0.911	0.925	1.142	1.169	1.569
X5= Net sales/ Total assets	0.558	0.584	576	0.546	0.636
Z Score	1.35	1.32	1.62	1.71	2.03
Average Z score			1.6		

(Source: Authors' calculations)

The UltraTech cement industry is in between the Dangerous and Safe zones right now from the Table 5. This means that the company is no longer under imminent danger, but it is not completely safe just yet. UltraTech Cement Industry is now robust enough to grow after years of hard effort. There has been an increase in both revenue and profit for the business over the last two years. The firm is in the danger zone since its working capital to total assets ratio improved from a negative -0.007 in FY 2020 to a positive 0.042 in FY 2021. When the z-score improves over time, that's good news. The firm's Z-score hovered at 1.60 throughout the research period.

Table 6: Z score analysis for India Cements

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	-0.011	-0.027	-0.057	-0.081	-0.026
X2= R.E/ Total assets	0.009	0.006	-0.003	0.02	0.003
X3= EBIT/ Total assets	0.011	0.008	-0.006	0.029	0.004
X4= Market cap. / Total liabilities	0.941	0.893	0.896	1.068	0.975

X5= Net sales/ Total assets	0.499	0.509	0.444	0.41	0.401
Z Score	1.09	1.05	0.88	1.07	0.97
Average Z score			1.015		

(Source: Authors' calculations)

Table 6 talks about India Cements, one of the oldest corporations in the business, is also struggling. It is a major rival to every other firm in the sector and beyond. Cement production in India ran into a few hiccups between FY 2015 and FY 2020, but everything settled out by FY 2021. For the fiscal year 2021, the ratio of operating income to total assets, which is a major factor in determining the Z score, increased, but it has since begun to decline. In FY 2020, the Z score value similarly fell, but the line for the Z score became positive in the following years. The industry is unable to enter the safety zone since the z value is not stable over a 5-year period.

Table 7: Z score analysis for Dalmia Bharat

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	0.085	0.087	0.093	0.049	0.016
X2= R.E/ Total assets	0.009	0.013	0.017	0.003	0.022
X3= EBIT/ Total assets	0.012	0.015	0.019	0.004	0.024
X4= Market cap. / Total liabilities	32.24	74.31	107.63	26.91	66.06
X5= Net sales/ Total assets	0.028	0.033	0.038	0.025	0.043
Z Score	19.53	44.79	64.82	16.25	39.81
Average Z score			37.04		

(Source: Authors' calculations)

Companies with a score of less than 1.8 are very likely to fail financially, while those with a score greater than 3 are less at risk of failing. The data above Table 7 shows that the Dalmia Bharat cement business has the greatest z score. The reason for this is the very high value of stocks now trading on the market. An essential factor in keeping the z-score stable is the market value of equity. Changes in market share prices also contribute significantly to the growth or decline of MVE. The z-score has risen steadily from FY 2018 through FY 2020, levelled off in FY 2021 (albeit it was still more than 2.99), and continued rising in FY 2022. The average z score for successful businesses is 37.04, indicating that this one is in great financial shape.

Table 8: Z score analysis for JK Laxmi

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	-0.071	-0.083	-0.05	0.0006	0.079
X2= R.E/ Total assets	0.018	0.017	0.052	0.078	0.088
X3= EBIT/ Total assets	0.023	0.024	0.023	0.106	0.115
X4= Market cap. / Total liabilities	0.478	0.519	0.563	0.805	1.207
X5= Net sales/ Total assets	0.775	0.884	0.899	0.956	1.055
Z Score	1.09	1.19	1.33	1.89	2.37
Average Z score			1.58		

(Source: Authors' calculations)

It's safe to say from Table 8 that JK Laxmi Cement is in the middle of the road. This represents the fact that the corporation is no longer in immediate danger, but is still not in the

clear as of yet. JK Laxmi cement, after years of struggle, has finally stabilized and is expanding. Over the previous two years, the company's sales and earnings have both been on the rise. The sector benefits from the EBIT ratio rising steadily after FY 2019-20. In addition, we can see that the yearly net sales have been improving. The cement sector at JK Laxmi is certain to join the safe zone between 2018 and 2022, since the z value is expected to continue rising in a positive direction.

Table 9: Z score analysis for Star Cement

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	0.029	0.342	0.256	0.247	0.189
X2= R.E/ Total assets	0.125	0.166	0.135	0.083	0.092
X3= EBIT/ Total assets	0.135	0.181	0.155	0.091	0.089
X4= Market cap. / Total liabilities	0.988	2.128	2.23	2.065	2.12
X5= Net sales/ Total assets	0.87	1.123	1.113	0.89	1.151
Z Score	2.12	3.64	3.46	2.84	3.07
Average Z score			3.03		

(Source: Authors' calculations)

Table 9 details the Star Cement's operations, and as we all know, a firm with a Z-score greater than 2.99 is very unlikely to go bankrupt. In the "grey zone," where the probability of bankruptcy is around 50%, a firm with a Z score between 2.99 and 1.23 is considered to be in a stable financial position. By comparing the numbers; we may conclude that Star Cement is doing well financially. When comparing fiscal years 2018 and 2019, they fail to reach the safe zone but succeed in doing so in the latter year with a z-score of 3.64. But the z value suddenly drops in FY 2021 as the years pass. Where we observe net sales falling, management took action, and by the next year, net sales had recovered to the 1.151 billion mark, well within the acceptable range. Since the z-score has been steadily rising, investors need not worry about the firm going bankrupt any time soon.

Table 10: Z score analysis for Sagar cement

Particulars	2018	2019	2020	2021	2022
X1= W.C/ Total assets	0.015	-0.024	-0.039	0.003	-0.028
X2= R.E/ Total assets	0.037	0.017	0.021	0.091	0.038
X3= EBIT/ Total assets	0.058	0.025	0.027	0.136	0.061
X4= Market cap. / Total liabilities	1.679	1502	1.604	1.348	0.923
X5= Net sales/ Total assets	0.583	0.061	0.515	0.665	0.592
Z Score	1.85	1.59	1.55	2.05	1.36
Average Z score			1.68		

As can be seen from the Table 10 and the figure below, the Sagar cement industry is at risk in FY 2022 since its z value is less than 1.810. There is progressive shift in sales, thus the industry's net sales are likewise not in excellent financial shape. In FY 2018, businesses in this sector had net sales of $0.583, but in FY 2019 they will be lucky to scrape together $0.061. It's also worth noting that the EBIT ratio is on a descending trend; it increased somewhat in FY 2021, but continued falling the following year. According to the aforementioned financial statistics, the Sagar cement business is in a high-risk area, with an average z-score of 1.68.

CONCLUSION

Financial position of any company is the true picture of its business performance. Most of the financial decisions are taken on the basis of financial soundness of the company. In this reference, Altman's Z- Score model plays a crucial role in predicting bankruptcy. This study is conducted to compare, analyze & predict the financial performance of the selected cement companies of India. The study reveals that most of the companies are not at good financial position. The study talks about the financial health of the sample companies belonging to the cement 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 needed to make judgments 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 results, 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 companies suffer from a large proportion of cash being spent on meeting the debt obligations, if the working capital is looked after then at least the short-term operating cost and the short-term debt will be maintained.

REFERENCES

Altman, E. I. (1968). Predicting financial distress of companies: Revisiting the z-score and zeta model.

Arun Vadyak. (2017). Altman's Z – Score Analysis of International Journal of Research in Management, Economics and Commerce.

B S R Murthy, K. R. (2018). Predicting Bankruptcy of Heritage Foods Company by Applying Altman's Z-Score Model. IJIRT.

Dr. Sarika Lohana. (2014). "Measuring Financial Sustainability of Reliance Industries Limited by using 'Z'- Score Model" from International Journal of Scientific & Engineering Research, Volume 5, Issue 5, May-2014, page no – 61to 72, ISSN 2229-5518.

Gnyana Ranjan Bal. (2015). "Prediction of financial distress using Altman Z-score: a study of select FMCG Companies" from Indian journal of applied research, Volume: 5, Issue:9, ISSN - 2249-555.

Khalid Alkhatib, Ahmad Eqab Al Bzour. (2011). Predicting Corporate Bankruptcy of Jordanian Listed Companies: Using Altman and Kida Models, International Journal of

Business and Management Vol. 6, No. 3; ISSN 1833-3850 E-ISSN 1833-8119.

Manoharan Kannadhasan. (2007). Measuring Financial Health of a Public Limited Company Using 'Z' Score Model - A Case Study.

Sajjan, R. (2016). Predicting Bankruptcy of Selected Firms by Applying. International Journal of research Garnthaalayah.

Sakaria, S. V. (2014). Application of Altman model to review the financial status of major pharmaceutical companies in India.