PREDICTION OF FINANCIAL DISTRESS IN SELECTED FMCG COMPANIES USING THE ALTMAN Z-SCORE MODEL
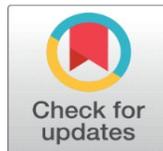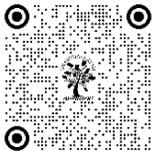
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ABSTRACT

Financial statement analysis has played a crucial role in evaluating a company's potential for financial difficulties, such as its ability to repay debts. Initially, credit suppliers utilized financial statement analysis to assess the creditworthiness of borrowers. However, in today's landscape, financial statement analysis has become widespread, involving a diverse range of ratios and catering to various users which include the suppliers, commercial banks, agencies involved in credit rating, existing and potential investors, higher management and others. Financial distress denotes to a company's incapacity to meet its financial commitments as they come due. Academic research in accounting and finance has predominantly emphasized defaulters of bond holders or bankruptcy as indicators of distress. The primary question revolves around whether the likelihood of distress significantly fluctuates based on the magnitude of financial statement ratios. This research study analyses the how sound the financial health of the company is and what are the probabilities of bankruptcy of selected companies belonging to the FMCG sector in India with the help of revised Altman Z-score model. This study focuses on the analysis of twenty (20) selected Fast Moving Consumer Goods (FMCG) companies listed on the Stock Index i.e Bombay Stock Exchange (BSE). These companies represent various segments such as Personal care, Food and Beverages, Alcohol and Cigarettes, Dairy, Food, Soaps and Detergents, Tobacco products, home care and other consumer durables. Based on the study's findings, it can be inferred that a majority of the companies in the FMCG sector in India exhibit good financial health and fall within the Safe Zone according to the Altman Z score model. The companies initially classified in the grey zone have shown improvements in their financial well-being in subsequent years. The Pearson correlation analysis reveals a noteworthy positive relationship between the variables and the Altman Z scores. Consequently, the study validates the effectiveness of the Altman Z score model as a reliable tool for predicting and forecasting the level of and impact of financial distress in companies. Emphasizing both the analytical and practical significance, this study aims to showcase the inherent value of using financial ratios. By employing financial ratios, this research underscores their potential to provide meaningful insights and practical applications in assessing corporate performance. As a result, investors can utilize this study to identify financially stable companies and make informed investment decisions based on the findings.

Keywords: Altman Z-Score, Financial Distress, FMCG Companies

1. INTRODUCTION

Financial distress is a situation in which a company or an individual are facing difficulties in generating sufficient revenues, resulting it in difficulties in meeting the company's financial obligations. The reasons for this is due to high fixed costs, higher illiquid assets, or revenues sensitive as per economic downturns. Overlooking the symptoms of financial distress it may get devastating if it goes out of control of the company. It may also happen that there may come a time when acute financial distress cannot be remedied due to company or individual's liabilities have increased so high and cannot repaid. If this happens, bankruptcy may be the only option (Hayes, 2021). As we know the recent economic slowdown has put many businesses in a financial distress. Furthermore, the covid 19 pandemic on

our country has been highly disruptive in both of economic activities as well as huge loss of human lives. Nearly every sector have been negatively impacted as domestic demand and supply out of nation sharply dropped with some prominent exceptions where high progress was observed (Upadhyay, 2021). Some of these businesses might even go bankrupt in the next few years. Now in order to identify such financially distressed businesses, Altman Z-Score model is used. The review of literature showcases ennumber of techniques to envisage the financial distress, although Altman Z-score has proved to be one of best model with a highest degree of accurateness. And many research studies have also stated Altman Z-score can be utilized to understand the high alerts of bankruptcy and can also assists in taking corrective measures for the same. The Z-Score is a pre-established score derived from a standardized calculation of financial ratios, serving as an indicator of the potential likelihood of corporate bankruptcy (Flourien Nurul Ch, 2018). An American finance professor by the name of Edward Altman developed a Z-Score model in the year 1968. The researcher stated that it is the quantitative tool which can be used to forecast the probability of business heading towards bankrupt in near future, say within next two years. The study shows that at its initial testing this model exhibited an of 72% (False negative-6%) accuracy level in forecasting and predicting the chances of being bankrupt in next two years (Patil, 2020). Researcher vouched the statement that this model of predicting the financial distress has been continued to measure Z-score over a period of time. From year 1969 until 1975 year, Altman measured at 86 companies in distress, then after 110 companies from year 1976 to 1995, and at last around 120 companies from year 1996 to year 1999, resulting that the Z-score exhibited the accuracy between 82% and 94% (Kenton, 2021). This research paper examines the financial well-being and probability of bankruptcy of selected company's belonging to the FMCG sector in India with the aid of revised Altman Z-score model.

2. REVIEW OF LITERATURE

The thought behind testing out the bankruptcy of companies came during the great depression. In the year 1936, a great statistician named Ronald Fisher arose out with a "Discriminant Analysis Technique. Altman Z Score model" is a customised form of this technique. The very first research to apply this statistical technique was Mr William Beaver's who's work got published in the year 1966 & 1968 to envisage and forecast bankruptcy for various businesses. Researcher Mr Beaver had applied this tool to examine the significance of each of the various accounting and finance ratios based on the statistical tool "Univariate analysis" which takes each accounting and finance ratio at a time. Altman's prime improvement was application of discriminant analysis which can take into consideration the multiple variables simultaneously. Hence finally in the year 1668 the researcher published the "Altman Z-Score model" which over the period has evolved greatly and has proved to be most significant and critical model in predicting the insolvency. Altman had taken a sample of 66 publicly owned manufacturing companies and made two groups out of it, firstly group one comprising of each 33 each bankrupt companies and second one comprising of successful companies 33 in each of the group. These companies were having assets size between $1 Million-$25 million. Initially 22 financial ratios were included by Altman in this model and then gradually he reduced it to five (5) significant financial ratios which were the based on best combination to forecast and predict corporate bankruptcy (Patil, 2020) The original Altman Z-Score model is as follows:

"$Z = 1.2 (X1) + 1.4 (X2) + 3.3 (X3) + 0.6 (X4) + 1.0 (X5)$"

This model has segregated three (3) categories under which the companies fall into- Distress zone, grey zone and Safe zone. The companies falling under safe zone are considered to be financially healthy and also stable. The companies falling in grey zone, such the companies are considered to be in moderate distress and such companies are required to prudently plan the finances and lastly in the third is distress zone where companies having those who have high probability of the business going insolvent in forth coming two years. The Z-score is linear blend of four or five combine common business ratios, which are weighted by coefficients. Such coefficients are estimated by finding out the set of firms which were declared insolvency and after that collecting a matched sample of companies which had sustained, with alike by industry and near size (assets) (2021). Altman's research discloses existence of three distinct types of financial ratios that, when combined, can effectively differentiate between bankrupt and non-bankrupt companies. Over the years, Altman Z- Score model was revisited and designed to applicable to privately held companies and to the emerging markets. (Flourien Nurul Ch, 2018) The Altman Z Score model for privately held companies is:

Figure 1

Figure 1 Three levels of original Altman Z Score model

Z' = 0.717 (X1) + 0.847 (X2) + 3.107 (X3) + 0.420 (X4) + 0.998 (X5)   and

The Altman Z- Score model for emerging markets is:

Z'' = 6.56 (X1) + 3.26 (X2) + 6.72 (X3) + 1.05 (X4)

The three zones under each model are different for different categories of the companies:

Table 1

Table 1 Criteria for Interpretation of Altman Z Scores			
	Original (Z) model	**Revised (Z') model**	**Revised (Z'') model**
Distress Zone	**< 1.81**	**< 1.23**	**< 1.10**
Grey Zone	**1.81 - 2.99**	**1.23 - 2.90**	**1.10 - 2.60**
Safe Zone	**> 2.99**	**> 2.90**	**> 2.60**

The significance of this model became highly pronounced during the 2007-08 financial crisis. In 2007, the Altman Z Score indicated a prominent increase in companies' risks, suggesting a looming bankruptcy threat. Altmans calculated the median Z score of firms in that year, which stood at the 1.81. Such companies were initially credit rated at level B, specifying that 50% of the firms must have had ratings lower, indicating financial distress and a high likelihood of bankruptcy. Altman's calculations led him to anticipate a crisis and foresee a credit market meltdown. While the crisis did emerge, it originated from mortgage-backed securities (MBS) rather than corporate defaults, as predicted by Altman.

Nonetheless, in 2009, corporations experienced one of the highest default rates in history. (Edward I. Altman, 2008).

The Altman Z score model has been the focus of abundant studies conducted over time to evaluate the financial stability of different Firms. (Altman, July 2000) In this paper, two established models for evaluating the financial distress of companies incorporated are examined. Specifically, the discussion revolves around the Z-Score model (year 1968) and the ZETA credit risk model (year 1977). Practitioners worldwide continue to utilize both models for their assessments in various industries. The study assesses distinctive characteristics of business failures to identify and quantify the variables that serve as effective indicators and predictors of corporate distress. The aim is to emphasize the analytical and practical value associated with the use of financial ratios with the help of multiple discriminant statistical methodology. The research scholar used Returns of assets, Stability of earnings, Debt Service, Cumulative profitability. Liquidity, Capitalization, Size.

One of the revolutionary studies in the field of Finance related to ratio analysis and bankruptcy was conducted by (Beaver, 1967). In essence, this researcher's analysis focused on a single variable and paved the way for subsequent multivariate approaches pursued by both the author and other scholars. Through his work, Beaver discovered that several indicators could effectively discriminate between group of failed and non-failed companies up to 5 years before their eventual failure. While he initially expressed doubts about employing multivariate analysis, a commentator suggested exploring this method, leading to the development of the Z Score model. (Deakin, 1972) used the same variables which were identified by Beaver research scholar and Deakin implemented these indicators within a series of discriminant models that incorporated multiple variables and suggested a clear potential, ratios demonstrate their ability as reliable predictors of bankruptcy. (Chellasamy P., July 2021) Selected five footwear companies to evaluate the effectiveness and efficient of the Altman Z-Score model through ratios like liquidity ratio, current ratio, Compound Annual Growth Rate (CAGR), Quick Ratio etc. The researcher concluded significance of the widely recognized and effective Altman Z-Score model. It emphasizes that investors should evaluate a company's Z-Score before making investment decisions to mitigate the risk of financial loss resulting from potential financial failure. (Desheng Wu a, 2022) Proposed a hybrid stock market forecasting model, integrating a multi-layer perceptron artificial neural network "MLP-ANN" with the predictable Altman Z-Score model.

(Flourien Nurul Ch, 2018) The aim of this study is to investigate the predictive capability of the Altman Z-Score model, developed in 1984, in assessing the health status of state-owned enterprises which are been publicly listed on the Index of Indonesia i.e Indonesia Stock Exchange. (Kay M. Poston, 2011) This study aims to assess the effectiveness of ratio-based models in distinguishing between financially distressed firms that can successfully recover and those that ultimately fail to avoid entering a state of complete failure. The following section delineates the stages through which many firms pass as they transition from a failing state to the final, failed state. (2014-2017), June 2019) The objective of this study was to examine the ability of financial ratios in predicting the financial distress status of manufacturing companies that were listed on the Stock Exchange through liquidity ratio, solvency ratio and profitability ratio for the period from 2014-17. Based on the analysis, researcher articulated that the relationship between liquidity ratio and solvency ratio with financial distress is highly negative, indicating that as these ratios deteriorate, the likelihood of financial distress increases. Conversely, the profitability ratio exhibits a strong positive relationship with financial distress,

suggesting that higher profitability is associated with a lower probability of facing financial distress. (Ahmed, Volume 2 Issue 1 January-December 2019) Using logistic regression, researcher aimed to construct a financial distress prediction model that serves as an early warning system and identifies the specific financial ratios that exhibit significant weakness in distressed firms. A sample of 150 companies primarily from the manufacturing sector, listed on the Dhaka Stock Exchange, has been selected for this study. The study concluded that three predictors, viz Profit Margin, Fixed Charge Coverage Ratio (FCCR), and Cash Flow from Operations to Net Income(CFONI), demonstrate significant weaknesses in financially distressed companies. (Mohammed, 10(4), 2016) In this case study Researcher stated that, the financial health of a business firm is a matter of significant concern. Numerous techniques exist for assessing the financial health of a business firm. However, Altman's Z-score has established itself as a reliable and proven tool for this purpose. Research utilised five financial ratios namely networking capital to total assets NCTA, RETA, PBIT to TA and CFTL. (Harlan D. Platt) In this research factors associated with corporate financial distress have been examined across three continents by employing a multidimensional definition of financial distress, researcher investigated three hypotheses. The independent variables used for modelling purposes included a set of financial ratios like profitability, financial leverage, liquidity, operating efficiency, and growth. The studies inferred that Asian companies are at a higher risk of experiencing financial distress when they lack adequate operating leverage to sustain sales volume or fail to generate sufficient cash flow or operating earnings before depreciation charges.

3. OBJECTIVES
1) To predict the financial distress in selected fimms/companies which belong to the FMCG sector of India with the help of Altman Z Score model of bankruptcy.
2) To help investors identify healthy companies.

4. HYPOTHESES OF THE STUDY
Following hypotheses were formulated to be tested:
1) **H1:** There is a significant relationship between Working capital/Total Assets (X1) and Altman Z scores.
2) **H2:** There is a significant relationship between Retained Earnings/Total Assets (X2) and Altman Z scores.
3) **H3:** There is a significant relationship between Earnings before interest and taxes/ Total Assets (X3) and Altman Z scores.
4) **H4:** There is a significant relationship between Net worth or Book value of Equity/ Book value Total Liabilities (X4) and Altman Z scores.

5. RESEARCH METHODOLOGY
In this study, twenty (20) selected Fast moving consumer goods (FMCG) companies, representative of all segments such as Home care, Personal care, Food and Beverages, Alcohol and Cigarettes, Dairy, Soaps and Detergents, Tobacco products and other consumer durables, listed in the Bombay Stock Exchange (BSE) were analysed to study their financial soundness. Annual data for the financial year 2022-23, 2021-22, 2020-21, 2019-20, and 2018-19 is used for the calculation of

Altman Z Scores in this research paper. The data required for this study is retrieved from the Annual reports of those particular companies for the financial year (2022-23, 2021-22, 2020-21, 2019-20, and 2018-19), moneycontrol.com and valueresearch.com. The current has used to revised Z-score (4 variables) for emerging markets to predict chances of bankruptcy for selected FMCG companies.

The model is:

Z'' = 6.56 (X1) + 3.26 (X2) + 6.72 (X3) + 1.05 (X4)

Where,

X1 = Working capital/Total Assets (WC/TA)

X2 = Retained Earnings/Total Assets (RE/TA)

X3 = Earnings before interest and taxes/ Total Assets (EBIT/TA)

X4 = Net worth or Book value of Equity/ Total Liabilities (NW/TL).

The significance of these ratios can be stated as follows:

X1 = Working Capital/ Total Assets (WC/TA)

The working capital/total assets ratio is often used in financial management studies, as it measure the ratio of net liquid assets of the firm relative to the companies total capitalization. The said ratio assesses a firm's ability to cover its short-term financial Liabilities i.e Total Current Liabilities) by comparing its Current Assets to its Total Assets. This ratio provides results which will help to understand the liquidity position of the company as this ratio focus on revealing the portion of balance liquid assets compared to the company's Total Assets. If the outcome results in increasing working capital this is a positive sign, reflecting the company's liquidity has improvised over the period of time. A lower ratio indicates that too many current liabilities may result in decreasing the working capital accessible.

X2 = Retained Earnings/Total Assets (RE/TA)

In the equity section of balance sheet Retained earnings is entered. In simple words it is the portion of all the profits the firm from the time of inception after subtracting the profits which are been distributed to the preference and equity shareholders in return of their shareholders termed as dividends. When the company earns profits the decision of distributing or retaining profits in the form of dividends to shareholders is taken by higher management as it requires thorough understanding of consequences of decision once take. If all the profits are retained or reserved with the company or pay very less dividends may demotivate the investors who investors with the financial goal of earning regular incomes for the shareholder in the company. Company with the vision to expanding in future or increasing the level of production capacity may be retained huge portion with them for financing such expansion. The earnings which are retained by the company in relation to its total assets Retained earnings to total assets depict the financial leverage of the entities; it indicates how assets were financed from retention of profit instead of paying profit out as dividends and acquiring loans. A high or increasing Retained Earnings to Total Assets ratio is usually a positive sign, showing the company is able to continually retain increasingly more earnings. As a company grows and matures, you should see this ratio increase.

X3 = Earnings before Interest and Taxes/ Total Assets (EBIT/TA)

EBIT can be calculated as revenue minus expenses excluding tax and interest. EBIT is also referred to as operating earnings, operating profit, and profit before interest and taxes. Earnings before Interest and Taxes / Total Assets are calculated by simply dividing a company's EBIT by the firm's total assets. Investors can use this ratio to ascertain how effective a company is at using assets to generate profits (i.e.

earnings before interest and taxes). This measures the 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, Edward Altman found that this measure continually outperforms other profitability measure in assessing the risk of corporate failure, including cash flow.

X4 = Net worth or Book value of Equity/ Total liabilities (NW/TL).

Book value of equity is calculated by subtracting total liabilities from total assets. Book value is the amount that investors would theoretically receive if all company liabilities were subtracted from all company assets; this leaves a residual amount available for distribution to investors. This ratio is an indication of the long-term financial soundness of a commercial entity, without being dependent upon excessive debt capital.

The data required for this study is computed using Ms-Excel and IBM SPSS (Version 25) software. The Pearson correlation coefficient is used to test the mentioned hypotheses.

6. DATA ANALYSIS AND INTERPRETATION

On computing the Altman Z scores of the selected FMCG companies (Refer tables 2 to 21) it is observed that most of the companies (like Hindustan Unilever, Godrej Consumer, Dabur, Britannia, Marico, Colgate, 3M, Galaxy Surfactants, Tasty Bite Eatables, Godfrey Philips, Mrs Bectors, Prataap Snacks, Parag Milk Foods, TATA Consumers and Avanti Feeds) show Altman scores that indicate financially healthy state and are in the Safe Zone. Companies like Godrej Consumers (Refer table: 3), Dabur (Refer table: 4), Marico (Refer table: 6), 3M India (Refer table: 8), TATA Consumers (Refer table: 16) and Avanti Feeds (Refer table: 18) are seen outperforming others in the industry. The highest Z score was observed in case of Avanti Feeds Ltd. at 14.02 in the year 2022-23 (Refer table: 18) and the lowest Z score was observed in case of Kovilpatti Laxmi Roller Flour Mills Ltd. at 1.73 in the year 2020-21 (Refer table: 21). As per the data computed, the companies found in Grey Zone are Jyothy Labs Ltd. in the year 2018-19 with a Z score of 2.56 (Refer table: 10), Heritage Foods Ltd. in the year 2021-22 with a Z score of 2.18 (Refer table: 17), Venky's India Ltd. in the year 2021-22 with a Z score of 2.57 (Refer table: 19), Kokuyo Camlin Ltd. in the years 2019-20 and 2018-19 with the Z scores 2.48 and 1.82 respectively (Refer table:20) and Kovilpatti Laxmi Roller Flour Mills Ltd in the years 2020-21, 2019-20, 2018-19 with Z scores of 1.73, 1.87, 1.96 (Refer table: 21) accordingly.

Table 2

Table 2 Hindustan Unilever Ltd.						
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.04	0.1	0.17	2.3	7.07	Safe
2	2021-22	0.14	0.39	0.53	0.69	6.47	Safe
3	2020-21	0.16	0.4	0.52	0.75	6.62	Safe
4	2019-20	0.14	0.26	0.45	0.7	5.52	Safe
5	2018-19	0.14	0.26	0.44	0.79	5.56	Safe

Table 3

Table 3 Godrej Consumers Ltd.						
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.09	0.6	0.22	4.75	8.99	Safe

S. No.	Year	X1	X2	X3	X4	Z score	Zone
2	2021-22	0.05	0.49	0.22	2.83	6.3	Safe
3	2020-21	0.03	0.48	0.24	2.83	6.34	Safe
4	2019-20	0.07	0.45	0.21	2.34	5.8	Safe
5	2018-19	0.04	0.45	0.19	2.45	5.58	Safe

Table 4

Table 4 Dabur India Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.69	1.79	1.61	2.68	6.78	Safe
2	2021-22	0.3	0.56	0.27	2.99	8.73	Safe
3	2020-21	0.11	0.51	0.29	2.47	6.92	Safe
4	2019-20	0.12	0.55	0.26	2.67	7.13	Safe
5	2018-19	0.11	0.5	0.27	2.35	6.63	Safe

Table 5

Table 5 Britannia Industries Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.09	0.62	0.35	0.81	5.82	Safe
2	2021-22	0.14	0.42	0.29	1.44	5.75	Safe
3	2020-21	0.26	0.56	0.33	2.5	8.38	Safe
4	2019-20	0.3	0.54	0.34	2.32	8.46	Safe
5	2018-19	0.25	0.54	0.36	2.31	8.24	Safe

Table 6

Table 6 Marico Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.32	0.65	0.33	2.09	8.69	Safe
2	2021-22	0.37	0.67	0.34	2.31	9.32	Safe
3	2020-21	0.33	0.58	0.28	2.75	8.81	Safe
4	2019-20	0.34	0.58	0.28	3.1	9.25	Safe
5	2018-19	0.32	0.6	0.32	3.4	9.7	Safe

Table 7

Table 7 Colgate Palmolive Ltd							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	-0.08	0.26	0.53	0.67	4.54	Safe
2	2021-22	0.05	0.6	0.48	1.58	7.18	Safe
3	2020-21	-0.01	0.54	0.49	1.23	6.28	Safe
4	2019-20	0.03	0.58	0.45	1.48	6.67	Safe
5	2018-19	-0.05	0.54	0.43	1.23	5.6	Safe

Table 8

Table 8 3M India Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.44	0.75	0.09	3.19	9.27	Safe
2	2021-22	0.44	0.77	0.14	3.58	10.08	Safe
3	2020-21	0.34	0.74	0.22	2.93	9.2	Safe

S. No.	Year	X1	X2	X3	X4	Z score	Zone
4	2019-20	0.55	0.71	0.25	2.57	10.28	Safe
5	2018-19	0.44	0.63	0.22	1.74	8.25	Safe

Table 9

Table 9 Galaxy Surfactants							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.18	0.61	0.19	1.88	6.414	Safe
2	2021-22	0.16	0.61	0.21	1.78	6.32	Safe
3	2020-21	0.16	0.57	0.23	1.49	6	Safe
4	2019-20	0.15	0.49	0.17	1.17	4.94	Safe
5	2018-19	0.14	0.46	0.2	1.06	4.87	Safe

Table 10

Table 10 Jyothy Labs Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.16	0.23	0.24	1.91	5.41	Safe
2	2021-22	0.02	0.1	0.21	1.36	3.3	Safe
3	2020-21	0.06	0.17	0.22	1.53	4.02	Safe
4	2019-20	0.08	0.02	0.21	0.88	2.92	Safe
5	2018-19	0.17	-0.27	0.2	0.93	2.56	Grey

Table 11

Table 11 Tasty Bite Eatables							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.18	0.57	0.18	2.19	6.53	Safe
2	2021-22	0.08	0.54	0.23	1.99	5.91	Safe
3	2020-21	0.1	0.57	0.17	2.53	6.31	Safe
4	2019-20	0.14	0.58	0.13	2.8	6.62	Safe
5	2018-19	0.24	0.6	0.14	3.26	7.88	Safe

Table 12

Table 12 Godfrey Philips India Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.2	0.44	0.21	1.68	5.91	Safe
2	2021-22	0.07	0.41	0.16	1.27	4.21	Safe
3	2020-21	0.07	0.36	0.16	1.03	3.79	Safe
4	2019-20	0.04	0.35	0.16	1.08	3.61	Safe
5	2018-19	0.09	0.4	0.17	1.68	4.79	Safe

Table 13

Table 13 Mrs. Bectors Food Specialities Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.2	0.44	0.21	1.68	5.91	Safe
2	2021-22	0.07	0.41	0.16	1.27	4.21	Safe
3	2020-21	0.07	0.36	0.16	1.03	3.79	Safe
4	2019-20	0.04	0.35	0.16	1.08	3.61	Safe

| 5 | 2018-19 | 0.09 | 0.4 | 0.17 | 1.68 | 4.79 | Safe |

Table 14

Table 14 Prataap Snacks Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.11	0.26	0.08	2.76	5.01	Safe
2	2021-22	0.13	0.23	0.11	2.22	4.67	Safe
3	2020-21	0.16	0.22	0.11	3.02	5.68	Safe
4	2019-20	0.32	0.2	0.15	3.83	7.78	Safe
5	2018-19	0.02	0.22	0.12	1.65	3.39	Safe

Table 15

Table 15 Parag Milk Foods Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.29	0.23	0.08	1.28	4.51	Safe
2	2021-22	0.28	0.22	0.13	1.2	4.69	Safe
3	2020-21	0.27	0.21	0.16	1.4	5	Safe
4	2019-20	0.23	0.13	0.14	1.1	4.03	Safe
5	2018-19	0.2	0.09	0.06	0.97	3.02	Safe

Table 16

Table 16 Tata Consumer Products Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.18	0.26	0.08	5.08	7.88	Safe
2	2021-22	0.18	0.26	0.08	9.03	12.05	Safe
3	2020-21	0.35	0.55	0.12	7.92	13.21	Safe
4	2019-20	0.31	0.52	0.13	6.2	11.1	Safe
5	2018-19	0.12	0.35	0.1	5.99	8.88	Safe

Table 17

Table 17 Heritage Foods Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.05	0.51	0.3	2.25	6.39	Safe
2	2021-22	-0.05	0.32	-0.07	0.93	2.18	Grey
3	2020-21	-0.034	0.3	0.12	1.02	2.64	Safe
4	2019-20	0.05	0.25	0.09	0.85	2.64	Safe
5	2018-19	0.06	0.38	0.35	1.59	5.65	Safe

Table 18

Table 18 Avanti Feeds Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.64	0.72	0.24	5.6	14.02	Safe
2	2021-22	0.63	0.7	0.27	4.73	13.18	Safe
3	2020-21	0.56	0.7	0.27	4.97	12.94	Safe
4	2019-20	0.52	0.63	0.5	2.83	11.79	Safe

| 5 | 2018-19 | 0.39 | 0.54 | 0.38 | 1.99 | 8.96 | Safe |

Table 19

Table 19 Venky's (India) Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.26	0.33	0.23	1.61	6	Safe
2	2021-22	0.09	0.23	0.01	1.1	2.57	Grey
3	2020-21	0.19	0.26	0.22	1.3	4.74	Safe
4	2019-20	0.14	0.21	0.29	1.02	4.62	Safe
5	2018-19	0.08	0.38	0.22	0.64	3.91	Safe

Table 20

Table 20 Kokuyo Camlin Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.21	0.05	0.03	1.65	3.51	Safe
2	2021-22	0.18	0.07	0.08	1.07	3.07	Safe
3	2020-21	0.15	0.06	0.09	0.81	2.63	Safe
4	2019-20	0.12	0.04	0.08	0.97	2.48	Grey
5	2018-19	0.09	-0.02	0.05	0.9	1.82	Grey

Table 21

Table 21 Kovilpatti Laxmi Roller Flour Mills Ltd.							
S. No.	Year	X1	X2	X3	X4	Z score	Zone
1	2022-23	0.25	0.06	0.17	0.88	3.9	Safe
2	2021-22	0.2	0.01	0.18	0.82	3.41	Safe
3	2020-21	0.1	-0.04	0.09	0.57	1.73	Grey
4	2019-20	0.12	-0.02	0.1	0.46	1.87	Grey
5	2018-19	0.11	0.01	0.13	0.38	1.96	Grey
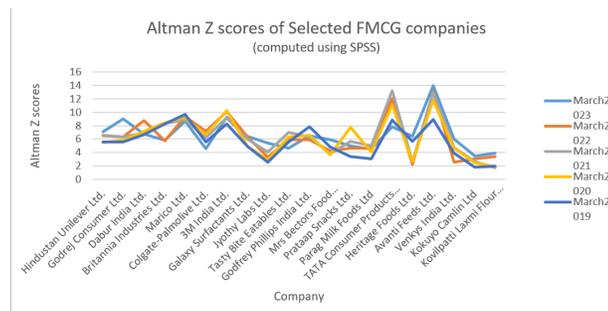
A Pearson Correlation coefficient test has been conducted to evaluate the hypotheses formulated for this study (Refer table: 23). Preliminary analysis showed that there were no violations in the assumptions of normality (Refer Figure2: Scatterplot). According to the correlation table there is a strong positive correlation (r= 0.769) between Working capital/Total Assets (X1) and Altman Z scores and the correlation is significant at 0.01 level. Therefore, we accept the H1 hypothesis. The correlation table indicates that there is a strong

Positive correlation (0.790) between Retained Earnings/Total Assets (X2) and Altman Z score and the correlation is significant at 0.01 levels. Therefore, we accept H2 hypothesis

Table 22

Table 22 Correlations							
		X1	X2	X3	X4	Z_Score
X1	Pearson Correlation	1	.460*	0.01	.593**	.769**
	Sig. (2-tailed)		0.041	0.968	0.006	0
	N	20	20	20	20	20
X2	Pearson Correlation	.460*	1	.461*	.501*	.790**
	Sig. (2-tailed)	0.041		0.041	0.024	0
	N	20	20	20	20	20
X3	Pearson Correlation	0.01	.461*	1	-0.148	0.28
	Sig. (2-tailed)	0.968	0.041		0.533	0.232
	N	20	20	20	20	20
X4	Pearson Correlation	.593**	.501*	-0.148	1	.855**
	Sig. (2-tailed)	0.006	0.024	0.533		0
	N	20	20	20	20	20
Z_Score	Pearson Correlation	.769**	.790**	0.28	.855**	1
	Sig. (2-tailed)	0	0	0.232	0	
	N	20	20	20	20	20

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).
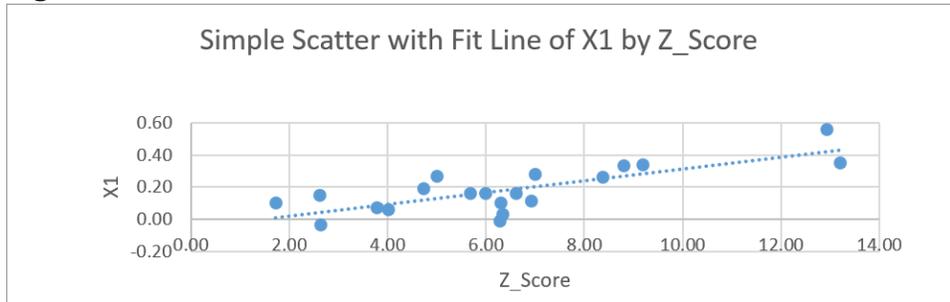
Figure 2

Figure 2 Scatterplot

The correlation table shows that there is a moderate positive correlation between Earnings before interest and taxes/ Total Assets (X3) and Altman Z scores. The correlation is insignificant at 0.232 levels. Therefore, we reject the H3 hypothesis. The correlation table also indicates that there is a strong positive correlation between Net worth or Book value of Equity/ Book value Total Liabilities (X4) and Altman Z scores, and the correlation is significant at 0.01 levels. Therefore, we accept the H4 hypothesis.

7. LIMITATIONS OF THE STUDY

The study is restricted to the 20 selected FMCG Companies and thus, this study cannot be considered as the representation of the entire FMCG sector of India.

8. CONCLUSION

According to the findings of the study, it can be concluded that majority of the companies in the FMCG sector of India are financially healthy and are in the Safe Zone as per the Altman Z score model. The companies that were found to be in the grey zone have been observed becoming financially well in the successive years. The Pearson correlation shows that there is a significant positive relationship between the variables and the Altman Z scores. The study shows that Altman Z score model is indeed an effective tool to predict the financial distress in a company. Investors can identify such financially sound companies through this study and take their investment decisions accordingly.

CONFLICT OF INTERESTS

None.

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