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ASSESSING FINANCIAL DISTRESS IN INDIA'S SELECTED CONSTRUCTION COMPANIES USING Z-SCORE, FULMER, AND SPRINGATE MODELS

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ABSTRACT
The Indian construction sector is a vital pillar of the country's growth, making a substantial contribution to GDP, jobs, and the growth of urban infrastructure. Despite its strategic significance, the industry is nonetheless quite susceptible to financial instability because of intrinsic risks such market fluctuations, project delays and regulatory uncertainty. Increasing debt, liquidity problems, causes financial distress to a company. This study relies on three well-known bankruptcy prediction models Altman Z-Score, Fulmer H-Score, and Springate S-Score to evaluate the financial health of ten listed Indian construction companies during a ten-year period (2015–2024). The study demonstrates whether the Construction companies face financial distress and compare the prediction results that shows how patterns in financial performance can shift significantly over time and emphasises the value of ongoing observation.
KEYWORDS: *Financial Distress, Altman Z-Score, Springate S-Score, Fulmer H-Score, Construction Industry, Bankruptcy Prediction.*

1. INTRODUCTION

The construction industry in India is a cornerstone of the nation's economic growth, significantly contributing to infrastructure development, industrialization, and urbanization. However, the industry's vital role in economic development also comes with its own set of challenges, which can create financial instability for companies.

A Financial distress, can be caused by Several factors including excessive debt, poor financial management, economic downturns, declining market demand, operational inefficiencies, and unexpected events like lawsuits or natural disasters. Common signs of financial distress include declining profits, difficulty in meeting payments, rising debt levels, layoffs, selling off assets, and falling stock prices. The companies analysed in this study are KNR Constructions Ltd., Simplex Infrastructure Ltd., RDB Realty & Infrastructure Limited., Mahindra Lifespace developers Ltd., Vascon Engineers Ltd., IRB Infrastructure Developers Ltd., Sadbhav Engineering Ltd., Jaiprakash Associates Ltd., Alpine Housing Development Corporation Ltd., Thakkers Developers Ltd

2. REVIEW OF LITERATURE

Hendra Wahyudi & et al, 2021, in their research, 'Altman Z-Score, Springate, and Zmijewski Methods' Analysis for Predicting Financial Distress in Manufacturing Companies Listed on the Indonesia Stock Exchange'. Examines the financial distress prediction of manufacturing companies in Indonesia's consumer goods sector using three models: the Altman Z-Score, Springate, and Zmijewski methods. It analyzes secondary financial data from 2014-2018 to assess the accuracy of these models in predicting bankruptcy. Among the three, the Zmijewski model had the highest accuracy at 100%, compared to 72% for Altman and 71% for Springate. The study provides insights for investors, creditors, and management regarding financial health assessment in investment decision-making.

Trisa Wahyuningsih and Lintang Venusita, 2022, In their study, 'Financial Analysis Of Retail Companies Using the Altman, Springate, Zmijewski, Fulmer, and Grover Bankruptcy Prediction Models' analyzes the financial condition of retail companies in Indonesia using five bankruptcy prediction models: Altman Z-Score, Springate, Zmijewski, Fulmer, and Grover. Covering the period 2019–2020, it evaluates 28 retail companies listed on the Indonesia Stock Exchange. The findings show variations in bankruptcy predictions due to differences in the financial ratios used by each model. Some companies were predicted to face bankruptcy, especially during the COVID-19 pandemic, while others maintained financial stability.

İnci Merve Altan and Ünal Şimşek, 2023, in their research paper, 'Evaluation of financial failure of healthcare companies traded in BIST with Fulmer H and Springate S Score Models' analyzes the financial stability of

healthcare companies listed on the BIST100 index from 2019 to 2022. Using Fulmer H and Springate S score models, the study assesses bankruptcy risks and financial performance. The study underscores the importance of financial management in healthcare to ensure efficient allocation of resources for maximum social benefit

Palash Saha & Sujana Ahmed, 2024, 'Comprehensive Analysis of Altman's Z Score, Zmijewski X Score, Springate S-Score and Grover G-Score Model for Predicting Financial Health of Listed Non-Bank Financial Institutions (NBFIs) of Bangladesh'. The study evaluates the financial health of Non-Bank Financial Institutions (NBFIs) in Bangladesh using four bankruptcy prediction models: Altman's Z-Score, Zmijewski X-Score, Springate S-Score, and Grover G-Score. Analysing 21 NBFIs listed on the Dhaka Stock Exchange, the research finds that Zmijewski's model is the most accurate in predicting financial distress, identifying 62% of firms at risk, compared to 48% by Altman and Grover, and 52% by Springate. The study highlights the importance of debt over profitability in financial distress prediction, offering valuable insights for policymakers, investors, and corporate managers.

3. OBJECTIVES OF THE STUDY

- To predict the potential financial distress that might occur on selected construction companies in India.
- Compare the predictive accuracy and reliability of the Altman Z-Score, Springate Model and Fulmer Model in forecasting financial distress.

4. RESEARCH METHODOLOGY

This study adopts a **descriptive research design**, which aims to capture the financial trends and distress signals without testing any hypotheses. It relies on **secondary data** sourced from publicly available financial statements over a ten-year period (2015–2024).

5. ANALYSIS AND INTERPRETATION

The Financial ratios of Selected Companies are calculated and analysed with the Financial distress models (i.e.) Altman Z Score, Fulmer H Score and Springate S Score models. Interpretation from each model provides results, that whether the company is under financial distress or financially stable, and results of each model is compared for every company and is interpreted.

5.1 Altman Z-Score

The Altman Z-score is a financial model developed by Edward Altman to predict the likelihood of a company going bankrupt. It combines five financial ratios using a weighted formula to assess a firm's financial health. A lower Z-score indicates higher bankruptcy risk, while a higher score suggests greater financial stability. A Z score of Z< 1.8 indicates potential Bankruptcy and Z score of 1.8<Z<3 indicates Gray area and Z>3 indicates Healthy financial status of the company.The Altman Z Score Prediction Formula for Non-Manufacturing service companies is:

$$Z= 6.56X1 + 3.26X2 + 6.72X3 +1.05X4$$

X1	Working Capital / Total Asset
X2	Retained Earnings / Total Asset
X3	EBIT / Total Asset
X4	Book value of Equity / Current Liablities

5.2 Springate S-Score Model: Focuses on key accounting ratios to predict bankruptcy using a multiple discriminant analysis approach.

An H score of (H > 0) makes it financially stable, (H < 0) shows Financial distress likely

$$S = 1.03 A + 3.0 B + 0.66 C + 0.40 D$$

X1	Working Capital / Total Asset
X2	EBIT / Total Asset
X3	Profit before Tax / Current Liablities
X4	Net Sales / Total Asset

5.3 Fulmer H-Score Model: A composite score involving nine variables that cover liquidity, profitability, asset turnover, and solvency.

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H= 5.528 (X1) + 0.212 (X2) +0.073 (X3) + 1.27 (X4) – 0.12 (X5) + 2.335 (X6) + 0.575 (X7) +1.083 (X8) + 0.894 (X9) – 6,075

X1	Retained Earnings/ Total Asset
X2	Net Sales / Total Asset
X3	Book Value of Equity / Total Debt
X4	Cash Flow / Total Debt
X5	Total Debts / Total Asset
X6	Current Liabilities / Total Asset
X7	Log of Fixed Asset
X8	Current Liabilities / Total Asset
X9	Log EBIT / Interest Expenses

An S Score of (S > 0.862) Shows Company is financially stable, and (S ≤ 0.862) shows Financial Distress

5.4 ALTMAN Z SCORE MODEL

COMPANY/YEARS	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
KNR CONSTRUCTIONS	4.458	4.271	3.866	5.060	5.388	6.242	6.561	7.266	9.414	9.560
Simplex Infrastructure Limited	7.696	7.962	8.645	8.615	9.269	2.642	-0.335	-2.443	-4.370	-4.654
Thakkers Developers Ltd	2.440	3.290	4.685	4.732	5.183	5.350	6.728	7.622	8.182	7.691
Vascon Engineers Limited	-3.254	2.126	3.976	3.958	4.389	4.847	3.640	4.550	5.531	5.099
RDB Infrastructure and Power Limited	4.618	2.132	3.877	4.557	4.270	2.839	3.416	3.771	3.052	-1.773
Sadbhav Engineering Limited	2.670	2.255	3.442	3.996	4.520	4.764	4.353	0.988	0.285	0.500
IRB infrastructures Ltd	0.419	-0.447	-0.514	-1.201	-1.743	-2.308	-0.780	1.473	1.156	0.312
Alpine Housing Development Corporation Ltd	11.824	12.279	13.030	10.107	12.326	5.940	6.397	7.231	7.055	7.469
Jaiprakash Associates	0.816	0.035	0.158	-0.574	-1.107	-1.384	-1.298	-1.603	-1.480	-2.022
Mahindra Lifespace Developers Ltd	6.519	5.312	5.300	6.582	6.507	5.919	4.046	4.798	3.715	2.811

Alpine Housing continuously receives top ratings, demonstrating sound financial standing. Despite recent little losses, Thakkers Developers, Simplex Infrastructure, and KNR Constructions are still stable and should be closely watched. On the other hand, Sadbhav Engineering, IRB Infrastructure, and Jaiprakash Associates remain in the distressed zone, signalling the possibility of insolvency. Performance issues are indicated by Mahindra Lifespace Developers' drop from a safe to a grey zone.

5.5 FULMER H-SCORE MODEL

COMPANY / YEARS	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
KNR CONSTRUCTIONS	-2.332	-1.241	-0.207	0.177	0.755	1.580	1.754	0.412	3.253	1.652
Simplex Infrastructure Limited	2.280	2.538	3.351	3.334	3.564	0.144	-3.218	-6.593	-10.603	-9.104
Thakkers Developers Ltd	-1.869	-1.421	1.718	0.123	0.412	0.683	5.509	10.220	8.401	3.639
Vascon Engineers Limited	-3.048	-2.800	-1.783	-1.030	0.145	0.498	0.573	0.394	2.944	1.436
RDB Infrastructure and Power Limited	0.436	-2.457	3.534	0.537	2.321	-1.118	0.739	0.183	-3.307	-3.469
Sadbhav Engineering Limited	-0.200	0.218	-0.582	0.990	0.142	2.378	1.712	-4.410	0.705	-1.818
IRB infrastructures Ltd	-1.682	-1.790	-1.352	-2.210	-1.177	-1.941	-2.001	-2.645	-2.326	-2.235
Alpine Housing Development Corporation Ltd	4.017	6.105	3.026	1.969	3.251	1.237	1.069	0.486	3.984	4.607
Jaiprakash Associates	-2.962	-3.562	-3.305	-3.881	-4.420	-4.683	-4.723	-4.524	-5.060	-5.792
Mahindra Lifespace Developers Ltd	3.965	1.533	2.156	4.619	7.840	5.027	3.964	1.682	0.051	-2.659

The Fulmer H-Score highlights Alpine Housing's exceptional financial health and low risk over the course of all years. Despite being viewed as weak in other models, Jaiprakash Associates exhibits strong Fulmer scores, indicating latent stability. Even if they have historically performed well, companies like Simplex Infrastructure, KNR Constructions, and Mahindra Lifespace have a worrying decreasing tendency, suggesting new concerns.

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Sadbhav Engineering and IRB Infrastructure exhibit ongoing financial difficulties, underscoring the serious dangers of insolvency.

5.6 SPRINGATE S-SCORE MODEL

COMPANY / YEARS	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
KNR CONSTRUCTIONS	0.583	0.863	2.727	4.169	4.145	3.293	3.615	4.655	6.528	5.805
Simplex Infrastructure Limited	2.383	2.530	2.634	2.584	2.673	-0.061	-0.680	-0.682	-0.705	-0.230
Thakkers Developers Ltd	0.554	0.516	0.885	0.610	0.579	0.591	1.111	2.036	1.517	0.478
Vascon Engineers Limited	-0.356	0.686	0.852	0.880	0.916	1.020	0.687	1.024	1.402	1.275
RDB Infrastructure and Power Limited	0.665	0.274	6.422	0.638	0.601	0.478	0.581	0.626	0.583	0.482
Sadbhav Engineering Limited	1.102	1.038	1.051	1.180	1.149	4.474	0.762	0.039	-0.085	0.079
IRB infrastructures Ltd	0.500	0.451	0.379	0.191	0.128	-0.104	0.034	0.322	0.255	0.255
Alpine Housing Development Corporation Ltd	1.784	2.123	2.174	1.725	2.076	1.012	1.025	1.107	1.076	1.172
Jaiprakash Associates	0.224	0.105	0.107	0.047	-0.063	-0.133	-0.077	-0.167	-0.095	-0.191
Mahindra Lifespace Developers Ltd	2.006	0.934	0.886	0.881	1.792	-0.092	0.977	0.899	0.652	0.266

KNR Constructions shows strong performance and sound financials per the Springate S-Score model. Simplex Infrastructure and Mahindra Lifespace started strong but now face growing risks. Vascon Engineers, Thakkers, and Alpine Housing remain moderately stable, though signs of stagnation exist. Sadbhav Engineering, IRB Infrastructure, and Jaiprakash Associates show deepening financial distress, highlighting urgent needs for restructuring and strategic action.

6. COMPARATIVE RESULTS BETWEEN THREE MODELS

1. **KNR Constructions Ltd**
   KNR has consistently remained within the safe zone for all three models. It demonstrates high solvency, outstanding liquidity, and strong operating efficiency. The increasing trend in Springate scores provides additional evidence of its increasing financial stability.
   Result: Financially sound with minimal risk of distress.
2. **Simplex Infrastructure Ltd**
   Simplex demonstrated sound financial standing up till 2019. All forecasts, however, predict a steep decline starting in 2020. Scores for Altman and Fulmer went sharply south, indicating extreme financial hardship.
   Result: Facing significant financial distress and possible insolvency.
3. **Thakkers Developers Ltd**
   Through 2022, the business showed financial improvement, maintaining safe scores across all models. A notable decline, particularly in the Springate model, was observed in 2024, indicating a decline in short-term liquidity.
   Result: Recently vulnerable requires strategic intervention to avoid further decline.
4. **Vascon Engineers Ltd**
   Vascon started off in financial trouble but improved steadily over the course of ten years. All three models now show steady, positive ratings, indicating a good recovery.
   Result: Recovered from distress currently financially stable.
5. **RDB Infrastructure Ltd**
   Financial indicators fell once more after a brief uptick from 2016 to 2018. With low profitability and liquidity, the company is currently in the distress zone according to all three models.
   Result: Financially unstable with rising risk needs corrective measures.
6. **Mahindra Lifespace Developers Ltd**
   Mahindra Lifespace started out strong with good scores but gradually moved towards the grey/distress zones. A significant decline in Fulmer scores indicated declining cash flow and worsening solvency.
   Result: At risk—performance trending downward.
7. **Sadbhav Engineering Ltd**
   Distress is consistently indicated by all three models after 2019. Fulmer fell sharply, Altman and Springate went negative, and significant operational and solvency issues were exposed.
   Result: Critically distressed urgent financial restructuring needed.

8. **IRB Infrastructure Ltd**
   Persistently poor outcomes for every model. Scores never reached safe area, indicating ongoing problems with profitability and debt management.
   Result: Chronically distressed long-term financial weakness.
9. **Jaiprakash Associates Ltd**
   The Company is classified as very distressed by Altman and Springate models. Fulmer, on the other hand, exhibits favourable outcomes, maybe as a result of its solitary strength. Overall, things are still not looking good.
   Result: Financially distressed despite isolated strengths.
10. **Alpine Housing Development Corp. Ltd**
    Alpine is one of the best performers. All models have consistently high scores, indicating superior liquidity, profitability, and financial management.
    Result: Extremely healthy—benchmark for financial strength.

7. CONCLUSION

The comprehensive research demonstrates how well financial prediction models work to identify early indicators of company financial trouble in the selected 10 Construction Companies. When combined, the Altman Z-Score, Fulmer H-Score, and Springate S-Score offer a multifaceted perspective of this company's financial situation. Few Companies exhibit sound financial management and long-term sustainability, but others face a significant risk of going bankrupt if prompt remedial action is not taken. The study emphasises the importance of financial distress thorough financial planning, regular assessment, and Strategic actions to save a company from Bankruptcy.

8. REFERENCE

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