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A Study of Altman Z-Score Model on TATA Solar Power and Adani Green Energy limited

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Abstract

The increasing emphasis on sustainable energy and the global shift towards clean technologies have intensified the need for rigorous financial analysis within the renewable energy sector. As key players in India's green energy transition, Tata Power Solar and Adani Green Energy Limited hold significant strategic and commercial relevance. This study aims to evaluate and compare the financial health and potential distress risks of these two leading solar power companies using the Altman Z-Score model—a widely recognized quantitative framework developed by Edward Altman in 1968 for predicting corporate bankruptcy. The model integrates five critical financial ratios that collectively assess a firm's profitability, leverage, liquidity, solvency, and operational efficiency, providing a comprehensive metric of overall financial stability.

This research adopts a case study methodology, utilizing secondary data sourced from official financial statements, industry reports, and other credible publications over a four-year period (2021–2024). The Altman Z-Score formula, adapted for publicly traded companies, is applied consistently across all years for both firms. The calculated Z-scores are then interpreted based on Altman's original classification criteria: the distress zone ($Z < 1.81$), grey zone ($1.81 < Z < 2.99$), and safe zone ($Z > 2.99$). Through this empirical analysis, Tata Power Solar is observed to show significant improvement over the study period, evolving from a distress zone score in 2021 ($Z = 1.71$) to approaching financial stability by 2024 ($Z = 2.88$). Adani Green Energy Limited, in contrast, consistently demonstrates healthier financial ratios, often nearing or breaching the threshold of the safe zone, indicating lower risk of insolvency throughout the examined timeframe.

Keywords: Altman Z-Score Model, Financial Health Assessment, Bankruptcy Prediction, Financial Distress Analysis, Financial Stability.

Introduction:

Financial health is a primary concern in every evolution landscape of global business. Investors, creditors and financial analytics are constantly looking for reliable techniques to assess the health and resilience of business across a wide range of industries. One such essential instrument that has endured the test of time in Altman Z Score Model, suggested by Altman (1968). The Altman Z score is the most extensively used measure for assessing financial distress. The model examines a Company's financial stability by examining its financial statements and ratios. The model Considers parameters such as profitability, leverage, Liquidity, Solvency and activity. The model is comprised of five financial ratios, each indicating a specific aspect of firm's financial health.

Objectives Of The Study:

- To understand the concept and methodology of Altman Z-Score models as a tool for predicting financial distress and bankruptcy risk.
- To determine the financial health of Tata Solar Power and Adani Green Energy Limited by using Altman's Z-Score mode
- To compare the financial stability of Tata Power Solar and Adani Green Energy Limited.

Hypothesis:

Null Hypothesis (Ho)

There is no significant difference in the financial health, bankruptcy risk, and financial stability of Tata Power Solar Systems Limited and Adani Green Energy Limited as measured by the Altman Z-Score model.

Alternative Hypothesis (H1)

There is a significant difference in the financial health, bankruptcy risk, and financial stability of Tata Power Solar Systems Limited and Adani Green Energy Limited as measured by the Altman Z-Score model.

Significance of the Study

- The study helps in evaluating the financial health and bankruptcy risk of Tata Power Solar Systems Limited and Adani Green Energy Limited using the Altman Z-Score model.
- It provides insights into the financial stability and operational efficiency of both companies.
- The study assists investors, creditors, and stakeholders in making informed financial and investment decisions.
- It contributes to understanding the application of the Altman Z-Score model in the renewable energy sector.
- The findings can serve as a reference for future research on financial distress prediction and corporate financial performance analysis.

Scope of the Study

The scope of this study is limited to analyzing and comparing the financial health and bankruptcy risk of Tata Power Solar Systems Limited and Adani Green Energy Limited using the Altman Z-Score model. The study is based on secondary financial data collected from annual reports and financial websites for a period of five years (2020–21 to 2024–25). It focuses on evaluating key financial indicators such as liquidity, profitability, leverage, and efficiency to predict financial distress and assess stability. The findings are intended to help investors, analysts, and stakeholders understand the financial position of both companies within the renewable energy sector in India.

Limitations Of The Study:

- This study is based on secondary data and applicable to data power solar and Adani Green Energy Limited.
- The study is to analyse the financial performance of companies not applicable for other dimensions of the companies.

Review of literature:

1. Zeynep Cindik {2021}

This literature review aims to predict companies' financial distress situation with the use of four different models; Altman Z score, Revised Altman Z Score (Linear Discriminant Analysis) and Quadratic Discriminant Analysis, Random Forest Machine Learning Model with the use of same variables suggested by Altman. A review of Altman Z score model for Turkey case is assessed whether it is applicable to Turkish companies and how accurate the results are. It includes both publicly traded companies and private companies.

2. Agus Arianto Toly {2020}

This review of literature aims to elaborate the possibility of financial distress in Indonesia public listed Companies from manufacturing field. The manufacturing industry was chosen because of its position as a sector that held a significant contribution in the Indonesia industry as a whole. The test tool used to forecast bankruptcy was Altman Z-Score model. This study also aimed to explain how each ratio affects financial distress.

3. Mohammed Shariq {2016}

This Model envisages predicting the possibilities of bankruptcy of manufacturing organization. Multiple discriminate analyses (MDA) are useful tools in such situations. The use of MDA helps to consolidate the effect of all ratios. Keeping the above view in mind, the "Z score" analysis has been adopted to monitor the financial health of the company. The main Objectives of the study is to assess the overall financial performance of the company. To know the efficiency in financial operations and to predict the financial health and viability of the company. The current study has been conducted to assess the financial health of a firm namely Raysut Cement Company SAOG and its subsidiaries in Oman. The study revealed that the Company Raysut Cement Company SAOG and its subsidiaries are financially sound as they have higher Z score than the benchmark (2.99) except in some years of study.

Secondary data: Analysis of 5 years 2021-2025

Research Design

The study adopts a **descriptive and analytical research design**. It aims to analyze and compare the financial health and bankruptcy risk of Tata Power Solar and Adani Green Energy Limited using the Altman Z-Score model based on historical financial data.

Data Collection Method

The study is based on **secondary data collection**. Data are collected from:

- Annual Reports of Tata Power and Adani Green Energy Limited
- Company websites
- Financial databases such as Moneycontrol, NSE, and BSE
- Journals, books, and research articles related to Altman Z-Score and financial distress prediction

Data Analysis

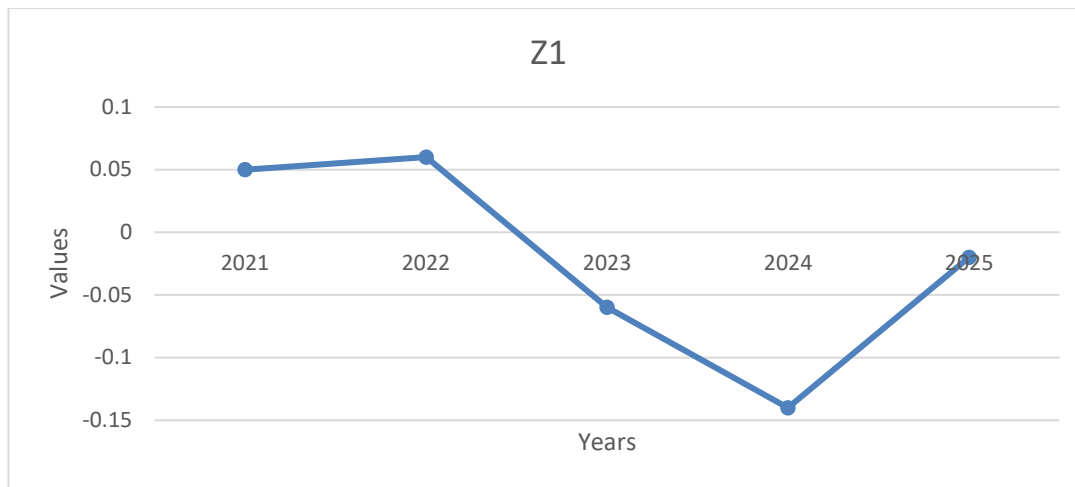
Altman Z-Score Model Of Adani Green Energy Limited:

Attributes	Coefficient	2021	2022	2023	2024	2025
Z1	1.2	0.05	0.06	-0.06	-0.14	-0.02
Z2	1.4	0.31	0.21	0.12	0.12	0.14
Z3	3.3	0.06	0.05	-0.01	-0.01	0.05
Z4	0.6	0.01	0.01	0	-0.01	0.02
Z5	1	1.03	1.24	0.27	0.29	0.35
Z-Score		1.72	1.78	0.32	0.26	0.70
Zone		Distress	Distress	Distress	Distress	Distress

(Table 3.2) Altman Z-Score of Adani Green Energy Limited

Analysing Each Attribute Of Altman Z-Score Model Using Line Chart:

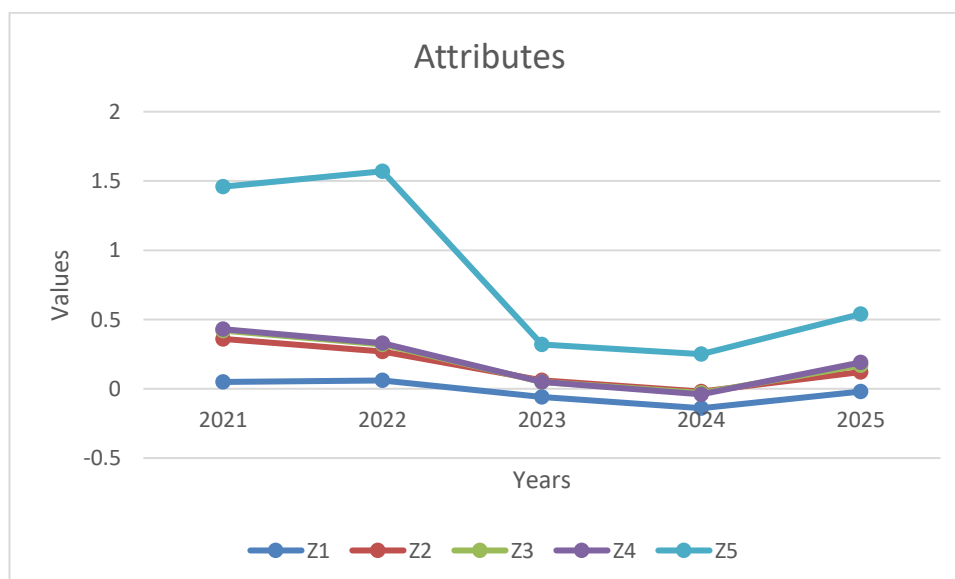
$Z1 = \text{Working Capital} / \text{Total Assets}$:



Interpretation:

The chart illustrates the trend of the Z1 value from 2021 to 2025, showing significant fluctuations and an overall decline during the observed period. In 2021, the Z1 value was approximately 0.05, which increased slightly to around 0.06 in 2022, indicating a small improvement in the company's financial position. However, from 2023 onwards, the value dropped sharply into the negative range, reaching nearly -0.06 in 2023 and declining further to about -0.14 in 2024. This negative trend suggests deterioration in financial performance, which may indicate increased financial risk, lower profitability, or operational inefficiencies. In 2025, the value improved slightly to around -0.02, showing signs of recovery, although it still remained below the positive levels recorded in the initial years. Overall, the chart reflects unstable financial performance with a considerable decline after 2022, followed by a minor recovery in the final year.

ANALYSING ATLMAN Z-SCORE MODEL OF ADANI GREEN ENERGY LIMITED USING LINE CHART:



(Figure 3.12) Graph from the Table (3.2)

Interpretation:

The chart presents the trends of five attributes, namely Z1, Z2, Z3, Z4, and Z5, from 2021 to 2025, showing fluctuations in the company's financial performance over the five-year period. Among all attributes, Z5 maintained the highest values throughout the period, increasing slightly from 2021 to 2022 before experiencing a sharp decline in 2023 and 2024, followed by partial recovery in 2025. Z2 and Z4 also showed downward trends after 2022, indicating weakening financial stability and profitability during the middle years. Z1 remained relatively low and turned negative in 2023 and 2024, suggesting financial stress or operational inefficiencies, although it improved slightly in 2025. Similarly, Z3 declined from positive values in 2021 and 2022 to negative values in 2023 and 2024 before recovering in the final year. Overall, the chart reflects that the company experienced stronger performance in the initial years, faced a significant decline during 2023 and 2024, and showed signs of recovery in 2025. The fluctuations indicate instability in financial performance, but the improvement in the final year suggests gradual recovery and better financial management.

Findings:

Tata Power Solar:

- Z1 shows an increasing trend from 0.02 (2021) to 0.17 (2024), indicating improving liquidity and working capital management.
- Z2 attribute also increases steadily from 0.02 (2021) to 0.17, (2024) suggesting that the company is accumulating retained earnings, which strengthens financial stability.
- Z3 variable Initially dips to 0.03 in 2022 but then recovers, reaching 0.07 in 2024. This reflects some fluctuations in profitability. But overall improving trend.
- Z4 variable Fluctuates slightly but shows a significant rise from 0.71 (2021) to 1.26 (2024), indicating that the company's market valuation is improving relative to its liabilities
- Z5 attribute fluctuates, peaking in 2022 (1.31), dropping in 2023 (1.06), and rising again in 2024 (1.46). This suggests variability in asset utilization efficiency, possibly due to market or operational factors.

Suggestions:

Tata Power Solar

- Improving Working Capital Management helps in maintain a positive net working capital to ensure liquidity. Optimise accounts receivable collection to improve cash flow and reduce inventory holding costs through efficient supply chain management.
- Focus on higher-margin products and services helps in reducing operational inefficiencies and production costs to increase profitability of the firm.
- Improve long-term debt management and consider equity financing or strategic partnerships to optimize interest expenses by refinancing at lower rates helps in reducing debt and strengthen solvency.
- Increase asset utilization to generate higher revenues from existing infrastructure, Invest in technology and automation to improve productivity, boosts asset efficiency.

Conclusion:

The overall analysis of the charts indicates that the company experienced mixed financial performance during the period from 2021 to 2025. The X variables (X1, X2, X3, X4, and X5) generally showed a positive and upward trend, reflecting improvement in operational efficiency, profitability, liquidity, and overall financial stability over time. Among these, X5 recorded the strongest growth, indicating better sales generation and asset utilization, while X4 also demonstrated significant improvement in financial strength. However, the Z-score attributes (Z1, Z2, Z3, Z4, and Z5) revealed fluctuations and instability in the company's financial condition. Most of the Z variables declined sharply during 2023 and 2024, with some values even turning negative, suggesting financial stress, reduced profitability, or operational challenges during those years. Despite this downturn, the company showed signs of recovery in 2025, as

several attributes improved and returned to positive values. Overall, the analysis suggests that although the company faced financial difficulties in the middle years, it gradually recovered by 2025, indicating improving financial management and the potential for better stability and growth in the future.

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