
**EXPERIENCE OF FINANCIAL HEALTH OF SELECT INDIAN OIL AND GAS
COMPANIES BY USING ZMIJEWSKI X-SCORE MODEL**

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Abstract

A firm that is financially stable is able to fulfill its obligations on time, but occasionally a company experiences losses and is unable to fulfill its obligations due to internal and external circumstances. Consequently, the company has financial difficulties and may even become bankrupt. The study focuses on Indian Oil and Gas companies to know the role of economic growth in India and predict the possibility of insolvency of the selected companies through testing of their financial health. The researcher selected eight companies from the Indian Oil and Gas sector for a time period of three years from 2020 to 2022 using Zmilweski X-score, and data was collected from Capital Line and calculated through Microsoft Excel. Findings suggested that most of the companies lay financially healthy and did not come in financial distress zones for three consecutive years 2020 to 2022 but in a few years, companies faced financial distress and lay in financial distress zones.

Keywords: - Zmijewski X-score Model, Indian Oil and Gas companies, Financial Distress, Not Financial Distress, and Capital Line.

1. INTRODUCTION

India's energy landscape is significantly reliant on oil and gas to fuel its economic growth and development. The country's oil and gas sector is crucial in meeting the energy demands of a rapidly growing population and a booming economy. India has a vibrant oil and gas sector with several major companies operating in various industry segments, including exploration, production, refining, and distribution. The sector is subject to various policy changes, market fluctuations, and technological advancements (Raut, R, et al. 2018).

1.1 Roll of Oil and Gas Companies in India' development

Oil and gas companies play a significant role in India's economic growth, primarily due to the country's heavy dependence on energy resources to drive its industrial and economic activities. Here are some key ways oil and gas companies contribute to India's economic growth. Oil and

gas are essential sources of energy for various sectors, including transportation, manufacturing, and power generation (Garg, N, et al. 2023). They provide a consistent and reliable energy supply, sustaining economic activities and growth. The oil and gas industry creates jobs, contributes to government revenue, and supports industrial development. Infrastructure and connectivity, investment, and technological innovation are also crucial for economic growth. The vast supply chain and ancillary industries contribute to economic growth, while energy security and rural development are further enhanced by oil and gas exploration and production activities (Rawat, A. et al. 2023).

1.2 An Overview of Oil and Gas Companies

The modern oil industry began in the mid-19th century with the discovery of oil deposits. The Standard Oil Company, founded by John D. Rockefeller in 1870, became a dominant force in the industry. Major players like Exxon, Shell, Chevron, and BP emerged in the 20th century through mergers, acquisitions, and exploration. Nationalization and OPEC played a role in the industry's growth (Tiewsoh, L. S. et al. 2017). Technological advancements, such as improved drilling techniques and seismic exploration, revolutionized the industry. Environmental and political challenges, such as climate change, geopolitical conflicts, and climate change debates, also impacted the industry. As concerns about climate change and sustainability grew, oil and gas companies began diversifying their portfolios into renewable energy sources like solar, wind, and biofuels. The energy transition towards cleaner alternatives in the 21st century has led to further shifts in oil and gas companies' strategies toward more sustainable practices (Narkhede, B. E et al. 2018).

1.3 Future Speculation of Oil and Gas Companies

Oil and gas companies worldwide, including India, are diversifying their energy portfolios and transitioning towards cleaner, renewable energy sources. They invest in renewable energy projects, expand downstream activities, and increase exploration and production (Narkhede, B. E et al. 2018). Government policies and regulations influence the sector's strategies, and digital transformation, climate initiatives, and strategic partnerships drive innovation. Companies may also expand their global presence by entering new markets or seeking international partnerships for exploration, production, and trading (Raut, R. D et al., 2017).

2. RESEARCH QUESTIONS

➤ There are three questions that have driven the study

(i) What is the financial health of the selected Indian Oil and Gas Company?

(ii) From the selected Indian Oil and Gas Company, which Indian Oil and Gas Company is experienced?

(iii) Which companies lay in which zone?

3. REVIEW OF LITERATURE

The Indian auto sector, accounting for 22% of manufacturing and 7.1% of GDP, is facing financial difficulties, according to a study using data from 2015-2016 to 2019-20 (Ajay Kumar Patel, et al. 2021). The study examines 21 Vietnam-listed pharmaceutical and medical companies using Z-score, S-score, and X-score models. The X-score forecasting model is the most accurate, but Vimedimex Pharmaceutical's VMD index falls below the financial safety standard (Hau, V. T., & Oanh, V. T. 2021). The study analyzes banking performance using Altman and Zmijewski models from 182 Malaysian, Thai, and Indonesian banks. Results show that 80 banks have bankruptcy indicators, 53 are in questionable zones, and 49 are considered health companies. Indonesian banks perform better than non-bankrupt banks (Munir, M. B., & Bustamam, 2020). The study compares financial distress levels in 32 Indonesian food and beverage enterprises before and after COVID-19, finding probable changes in financial difficulty and an increase in enterprises experiencing distress (Nafisamuna, N. 2022). The study compares Altman, Kida, and Zmijewski models for estimating the financial success of Saudi-listed companies, finding the Zmijewski model superior and recommended for financial account analysis (Radhi, D. S. M., & Sarea, A. 2019). This study assesses the global bankruptcy prediction models developed by Beneish, Zmijewski, and Altman, as well as their financial applications. The study's conclusions are contradictory and are based on 24 scholarly studies that have been published since 2003. In certain studies, the models are effective, while in others, they exceed competing models. In order to accurately identify financial fraudulence through comparison research, the study advises concentrating on additional models (Azam, A., et al. 2023). In order to forecast financial difficulty in Indonesian companies listed on the IDX from 2019 to 2020, the study analyzes the Altman and Zmijewski models. The Zmijewski model scored 49.06%, while the Altman model scored 66.04% more precisely. 53 companies were surveyed for data using purposive sampling (Ramly, R., & Amilia, A. A. 2023). The study examines three models for predicting future bankruptcy in industrial and chemical manufacturing businesses in Indonesia that are listed on the Indonesia Stock Exchange for the period of 2017–2021. The Springate S-Score model was determined to be the most accurate model for forecasting bankruptcy in the study, which used data from 26 companies. It had the greatest accuracy rate of 96.15% and the lowest error of 3,85% (KHOFIFAH, D. P. 2023). Using the Zmijewski X-Score model, the study analyzes financial hardship in state-owned Indonesian businesses. Three businesses are in financial trouble, according to the results, while five are doing well. Data from financial report sources are processed using procedures for qualitative analysis in this research method (Kartiko, E., et al. 2023).

4. OBJECTIVES: -

- (i) To study the role of Indian Oil and Gas companies in the country's economic growth.
- (ii) To study the possible prediction of financial distress and not financial distress in selected companies.

5. RESEARCH METHODOLOGY

This study focused on secondary quantitative data which are taken from audited companies' financial reports from their official website on Capital Line. The period of the study is three consecutive years 2020 to 2022 and eight companies have been selected from the sector of Indian oil and gas company.

5.1 About Zmijewski-X Score

Zmijewski (1984) created the prediction model known as the Zmijewski Model. To obtain a more suitable pattern, Zmijewski employs the financial ratios of return on assets (ROA), leverage, and liquidity (Zmijewski, 1984). Zmijewski (1984) created the prediction model known as the Zmijewski Model. To obtain a more suitable pattern, Zmijewski employs the financial ratios of return on assets (ROA), leverage, and liquidity (Zmijewski, 1984). The choice of this financial ratio was not made based on theory but derived from previous experience and research. This was one of his complaints. Based on an analysis of 40 insolvent businesses and 800 healthy ones. A bankruptcy model called the Zmijewski Score is used to forecast a company's demise in two years.

The formula of the Zmijewski-X Score is,

$$X\text{-Score} = -4.3 - 4.5 * X_1 + 5.72 * X_2 - 0.004 * X_3$$

Where,

X₁ = ROI (Return on Assets)

X₂ = Leverage (Debt Ratio)

X₃ = Liquidities (Current Ratio)

- a. If X-Score > 0 = Unhealthy
- b. If X-Score < 0 = Healthy

6. DISCUSSION AND FINDINGS

In this paper, the researcher has calculated the X-score on the basis of its ratios, which interpreted and discussed their performance through a table, and graph. Further, the table indicates experiences on the basis of companies' X-scores, and the graph makes making easy the understand companies' performances Graph 2 indicates how many companies are in financial distress zones and how many are not in financial distress zones.

Table-1 Zmijweski X-score of Indian Oil and Gas Companies

Name of the Company/ Years	2020	Experience	2021	Experience	2022	Experience
Oil India Ltd	1.4436	Financial Distress	-2.6617	Not Financial Distress	-3.5118	Not Financial Distress

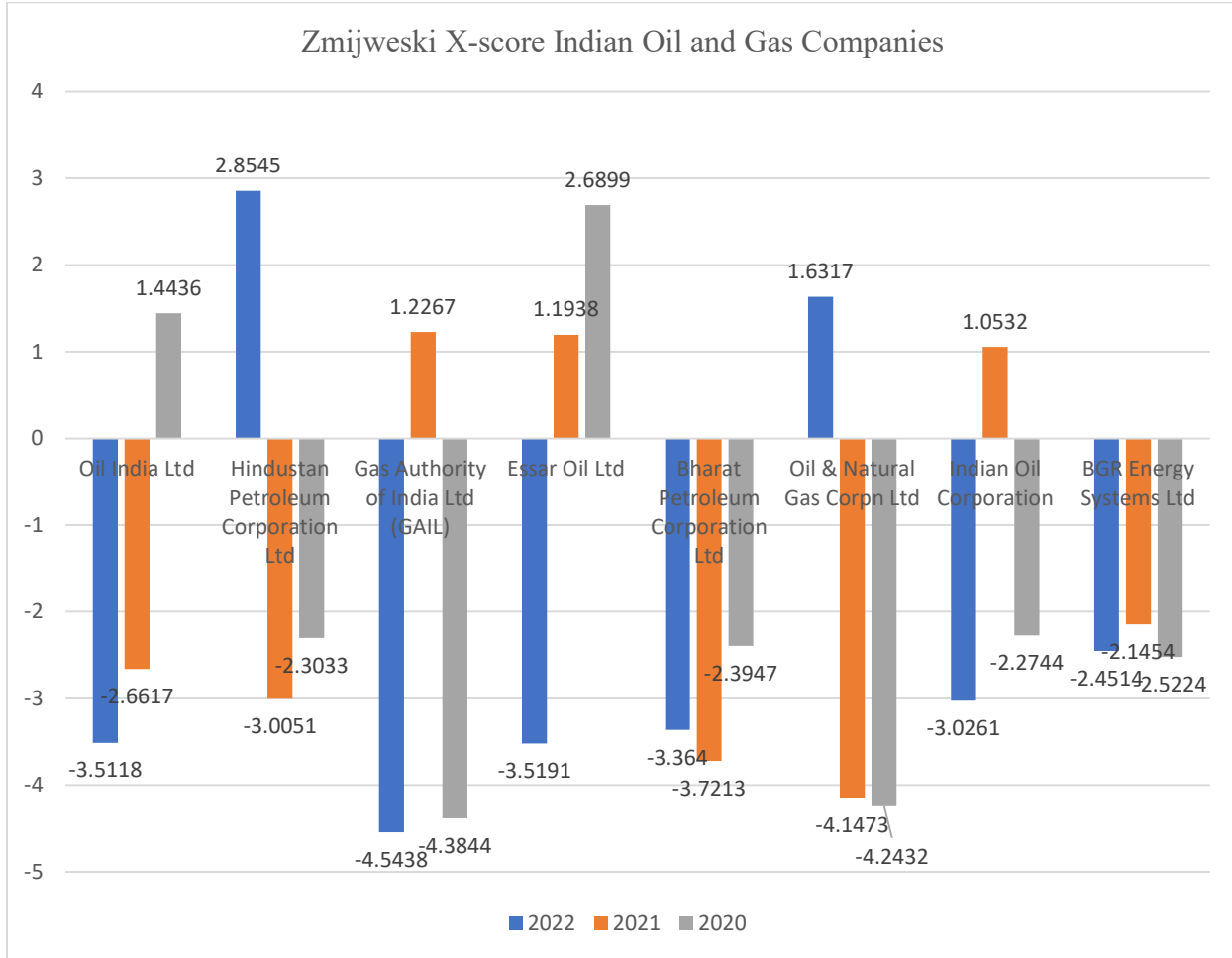
Hindustan Petroleum Corporation Ltd	-2.3033	Not Financial Distress	-3.0051	Not Financial Distress	2.8545	Financial Distress
Gas Authority of India Ltd (GAIL)	-4.3844	Not Financial Distress	1.2267	Financial Distress	-4.5438	Not Financial Distress
Essar Oil Ltd	2.6899	Financial Distress	1.1938	Financial Distress	-3.5191	Not Financial Distress
Bharat Petroleum Corporation Ltd	-2.3947	Not Financial Distress	-3.7213	Not Financial Distress	-3.364	Not Financial Distress
Oil & Natural Gas Corpn Ltd	-4.2432	Not Financial Distress	-4.1473	Not Financial Distress	1.6317	Financial Distress
Indian Oil Corporation	-2.2744	Not Financial Distress	1.0532	Financial Distress	-3.0261	Not Financial Distress
BGR Energy Systems Ltd	-2.5224	Not Financial Distress	-2.1454	Not Financial Distress	-2.4514	Not Financial Distress

Source: - Self Analysis by the researcher.

Table-1 indicates that Oil Indian Ltd faced financial distress in the year 2020 with an X-score of 1.4436 Whereas for the rest of the two years company lain in Not financial distress with an X-score of -3.5118 and -2.6617 respective years 2022 and 2021. Hindustan petroleum corporation Ltd indicates financial distress in 2022 with an X-score of 2.8545 whereas for the rest of the two years company lain in Not financial distress with an X-score of -3.0051 and -2.3033 for the respective years 2021 and 2020. Gas Authority of India Ltd (GAIL)indicates financial distress in 2021 with an X-score of 1.2267 whereas for the rest of the two years company lain in Not financial distress with an X-score of -4.5438 and -4.3844 for the respective years 2022 and 2020. Essar Oil Ltd indicates no financial distress in 2022 with an X-score of -3.5191 whereas for the rest of the two years company lain in financial distress with an X-score of 1.1938 and 2.6899 for the respective years 2021 and 2020. Bharat Petroleum Corporation Ltd indicates no financial distress in the respective years 2022 2021, and 2020 with a respective X-score of -3.3640, -3.7213, and -2.3947. Oil & Natural Gas Corpn Ltd indicates financial distress in 2022 with an X-score of 1.6317 whereas for the rest of the two years, the company lain in not financial distress with an X-score of -4.1473 and -4.2432 for the respective years 2021 and 2020. Indian Oil Corporation Ltd indicates financial distress in 2021 with an X-score of 1.0532 whereas for the rest of the two years company lain in not financial distress with an X-score of -3.0261 and -2.7244 for the respective years 2022

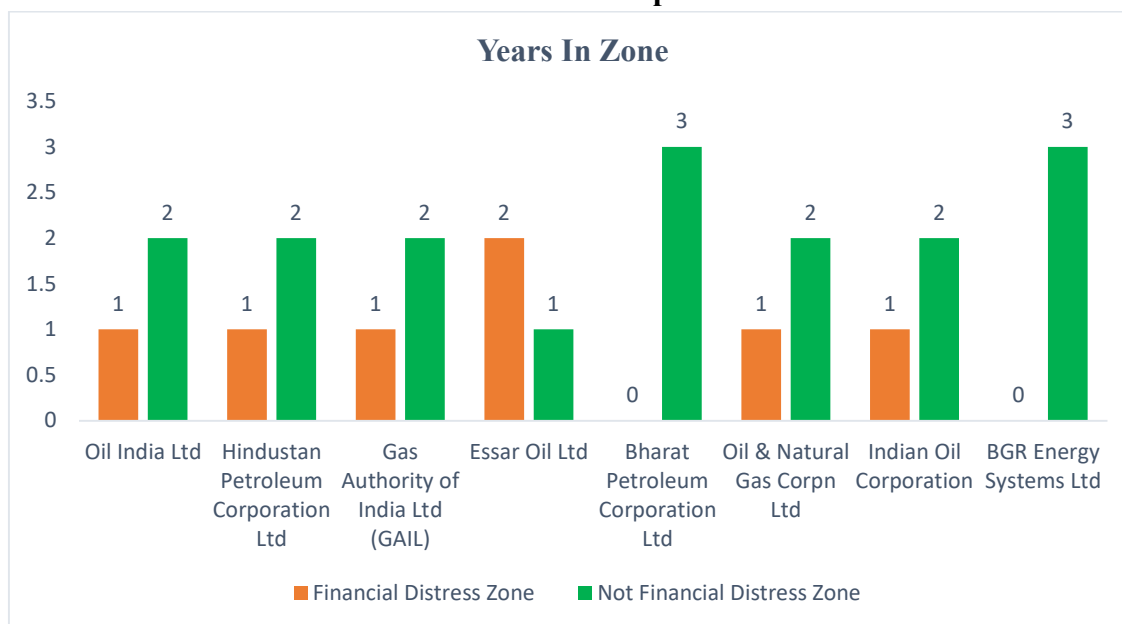
and 2020. BGR Energy Systems Ltd indicates no financial distress in the respective years 2022, 2021, and 2020 with respective X-scores of -2.4514, -2.1454, and -2.5224.

Graph-1



Graph-1 is for an easy understanding of companies' performance by graph whereas graph lay in negative than companies lain in not financial distress and if the graph indicates a positive then companies lain in financial distress. In this graph, all three selected years are indicated through their colors where blue presented 2022, orange presented 2021, and grey presented 2020. The graph also indicated that there are major oil and gas companies in not financial distress zone in their respective years and a few oil and gas companies in the financial distress zone in their respective years.

Graph-2



Graph 2 indicates that among three selected consecutive years 2020 to 2022, how many years companies lay in a financial distress zone, and how many companies lay in not financial distress zones? After calculating all the above data, the researcher found that there are most of the years companies lay in not financial distress zones and there are a few years when companies lay in financial distress zones, and also There are two companies namely Bharat Petroleum Corporation Ltd and BGR Energy Systems Ltd which lay in not financial distress zones of selected three consecutive years 2020 to 2022.

7. LIMITATION AND SCOPE OF THE STUDY

This study focused only on one sector of eight Indian Oil and Gas companies and used only one method Zmijweski X-score Model for testing financial health for a short time of period only three years which started from 2022 to 2020. So, there is a scope for further study to choose more than one sector, more than one model, and take many years' times of period.

8. CONCLUSION

Indian oil and gas sector is crucial for its economic growth and development in India which provides a consistent and reliable energy supply for various sectors such as transportation, manufacturing, and power generation. Technological advancements and environmental challenges have transformed the oil and gas industry, by prompting companies to diversify into renewable energy sources. Government policies, digital transformation, climate initiatives, and strategic partnerships drive innovation and global expansion. India's oil and gas sector companies have been experiencing financial health but for a few years some companies lay in distress, only two companies namely Bharat Petroleum Corporation Ltd and BGR Energy Systems Ltd have been financially healthy for three consecutive years 2020 to 2022. This indicates that the financial performance of these companies is excellent which is the result of dynamic decision-making and

wisdom of the management. This study focused only on a short period of three years with a single model and single sector. Hence there will be scope for further study in order to fill the gap.

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