MEASUREMENT OF FINANCIAL PERFORMANCE OF SELECTED INDIAN PHARMACEUTICAL COMPANIES BY USING THE ALTMAN' Z-SCORE MODEL

Arshe Azam[1]*, Nishar Ahmad[2], Imran Khan[3], Prof. Nisar Ahmed I. Mulla[4], Prof. Mohd. Razaullah Khan[5]

[1]Research Scholar, Department of Commerce & Business Management,
Maulana Azad National Urdu University Hyderabad (India).
Email id: azamarshe0@gmail.com

[2]Research Scholar, Department of Commerce & Business Management, Maulana Azad National Urdu University Hyderabad (India).

[3]Research Scholar, Department of Commerce & Business Management, Maulana Azad National Urdu University Hyderabad (India).

[4]Professor, Department of Commerce & Business Management, Maulana Azad National Urdu University Hyderabad (India).

[5]Professor, Department of Commerce & Business Management,
Maulana Azad National Urdu University Hyderabad (India).

* Corresponding Author

Abstract:

The pharmaceutical industry plays a pivotal role in the Indian economy, and the performance of pharmaceutical companies is of significant interest to investors, stakeholders, and policymakers alike. This study delves into the financial performance of selected Indian pharmaceutical companies using Altman's Z-Score model, aiming to evaluate their risk of insolvency. The research spans five years, from 2018-19 to 2022-23, focusing on key industry players: Cipla Ltd., Divis Laboratories Ltd., Torrent Pharmaceutical Ltd., Zydus Lifescience Ltd., and Abbot India Ltd. Altman's Z-Score, a composite metric considering liquidity, profitability, leverage, solvency, and market value, is employed to assess these companies' financial health with secondary data and quantitative method of analysis. The findings reveal a varied financial landscape among the selected companies. Cipla Ltd. and Divis Laboratories Ltd. consistently maintain safe financial positions. Torrent Pharmaceutical Ltd. and Zydus Lifescience Ltd. exhibit moderate stability, with some improvements over recent years. Abbot India Ltd. stands out with a robust and stable financial position, consistently residing in the safe zone. These results emphasize the importance of financial prudence, effective management, and adherence to industry standards to navigate the complexities of the pharmaceutical sector. The study underscores the significance of proactive financial management in safeguarding these vital industry players, ensuring continued contributions to India's healthcare landscape and global pharmaceutical markets.

Keywords: Financial Performance, Altman's Z-Score Model, Indian Pharmaceutical Companies, Financial Distress, Ratio Analysis, Risk Mitigation.

1. Introduction

Indian pharmaceutical companies often face bankruptcy due to economic downturns, regulatory issues, or mismanagement. The Insolvency and Bankruptcy Code (IBC) provides a time-bound process for resolution and liquidation. If a resolution isn't reached, the company goes into liquidation. The impact of bankruptcy can be severe, affecting patients, the industry's reputation, and job losses. To prevent bankruptcy, companies should maintain financial prudence, adhere to regulations, and adapt to market changes. Proactively addressing financial challenges and seeking professional help can mitigate the risk.

1.1 About Insolvency or Bankruptcy in the Business Sector

Bankruptcy is a state in which a business is unable to function, which makes it impossible for it to finance its operations properly and meet its financial obligations (Tron, 2021). Financial failure or financial strain, where the business is unable to handle its finances appropriately, are the usual causes of bankruptcy (Paule-Vianez et al., 2020). To ensure its longevity, every business must be able to conduct its operations effectively and follow the appropriate strategy (Buzgurescu & Elena, 2020). Throughout its existence, every company deals with the issue of operating efficiency or liquidity. However, when a corporation experiences financial difficulties, it has a direct impact on the worth of the company's operations. There are various causes of a company's financial difficulties and external responsibilities not being paid on time, and it's a very humiliating situation for all parties involved. A number of there are several causes for this condition, starting with inadequate management leading to an underperforming capital structure (Anjum, S. 2012). The company cannot produce enough EBITDA to cover its interest costs and principal loan balance. Funds are used in a lot of situations (Sane, R. (2019). The necessary for the expansion is funded by other sources, However, as time goes on, the business either the management or rivals is not effective enough to keep operating expenses in check, which is putting pressure on operating margins, EBITDA, and ultimately results in a failure to make loan payments to lenders as well as other outside parties (GUPTA, A. 2018). A further crucial area for such a problem is the incorrect preparation of Fixed Assets. Overspending on fixed assets is directly related to affecting asset efficiency, which again has an impact on pressure on the top line and, ultimately, the production of cash flow statements (Beaver, W. H. 1966).

1.2 Development of Indian Pharmaceutical Companies

Indian pharmaceutical companies have grown from a small and fragmented sector to one of the largest and most competitive in the world. Key factors include strong intellectual property laws, a skilled workforce, cost-effective manufacturing, regulatory compliance, an export-oriented approach, research and development, government support, outsourcing hubs, and international collaborations (Mol, R., Singh, et al. 2022). India's patent laws have evolved to protect pharmaceutical innovations and allow for generic medicines production. The country's education system has produced a large pool of pharmaceutical professionals, fueling R&D efforts. Indian pharmaceutical companies also benefit from low labor costs and infrastructure, allowing them to produce pharmaceuticals at a fraction of the cost in Western countries. Government support, outsourcing hubs, and international collaborations have contributed to the industry's growth and contribution to India's economy and the global pharmaceutical market (Sarwal, R., et al. 2021).

1.3 Role of Indian Pharmaceutical Companies in the Indian Health Sector

Indian pharmaceutical companies significantly contribute to the Indian health sector, focusing on research and development, manufacturing, distribution, and affordability of medicines (Grace, C. (2004). They produce high-quality generic medicines, which are more affordable alternatives to branded drugs, making essential medications accessible to a broader population. They also invest in R&D, contributing to the discovery of new drugs and the development of biosimilars. India is a significant exporter of pharmaceuticals, exporting medicines to over 200 countries (Festa, G., Rossi, et al. 2021). Indian pharmaceutical companies are major players in vaccine manufacturing, contract manufacturing, research collaboration, drug price regulation, healthcare infrastructure support, and community health initiatives. The pharmaceutical industry generates employment and provides jobs for professionals. However, challenges include continued investment in R&D, maintaining high-quality standards, and balancing innovation with affordability (Frew, S. E., et al.2007).

2. Review of Literature

The Z-Score model is examined for its ability to forecast bankruptcy and other forms of corporate difficulty, with an emphasis on how useful it might be for banks with global operations. Using various adaptations of the original model, the study assesses 31 European and three non-European countries. According to the study, the generic Z-Score model has an accuracy of roughly 0.75 and performs admirably for the majority of nations. A country-specific estimating method, however, can raise the classification accuracy to over 0.90(Altman, E. I., et al. 2017). The effectiveness of the Altman Z-Score bankruptcy prediction model in finance and related fields is examined in this research. It makes use of a sizable multinational sample of businesses from 31 European and three non-European nations and analyzes 33 scientific papers from the year 2000. While the broad international model performs admirably for the majority of nations, the study reveals that classification accuracy can be increased using country-specific estimation, particularly when using extra factors. As a result of the scarcity of thorough worldwide comparisons, it is challenging to generalize the findings (Altman, E. I., Iwanicz-Drozdowska, et al. 2014). From 2011 to 2016, the study looked at the accuracy of the Altman Z-score model in forecasting financial failure in insurance businesses listed on the Amman Stock Exchange. The study indicated that the Z-score model had strong predictive power using statistical analysis and multiple linear regression, which could be helpful for financial managers, auditors, lenders, and investors in making wise judgments amid financial collapse (Manaseer, S., & Al-Oshaibat, et al. 2018). With a focus on the ratio of working capital to total assets, the study employs discriminant analysis to forecast financial difficulty in 30 Malaysian enterprises. With financial statements from 15 companies, both in financial crisis and not, the analysis had a 76.7% accuracy rate (Thai, S. B., Goh, et al. 2014). The study looks into how well the Beneish M-model and Altman Z-score work in identifying corporate failure and financial malfeasance at Enron Corporation. The investigation reveals financial statement falsification by management. In order to effectively protect stakeholders, the study suggests including both models in audits (MacCarthy, J. 2017). Using Altman's Z-score and MDA, the study assesses the financial health of Raysut Cement Company SAOG and its Oman

subsidiaries. The results show a healthy financial situation, with some years of progress, which is helpful for decision-making (Mohammed, S. 2016). The financial crisis of 2008 made clear the need for early financial distress detection in businesses. This study evaluates the five-year financial health of pharmaceutical companies using Altman's "Z" Score Model (Panigrahi, C. M. A. 2019). 180 Soc Trang firms' bankruptcy risk was assessed using the Altman Z-score model, which showed that both financial and non-financial factors affect the risk (Prasetiyani, E., & Sofyan, M. 2020). The study fills the gap in Turkish bankruptcy prediction by using four models: the Altman Z score, the Revised Altman Z score, the Quadratic Discriminant Analysis, and the Random Forest Machine Learning Model (Cındık, Z., & Armutlulu, I. H. 2021).

3. Objectives of the study

(i) To measure the financial performance of selected Indian pharmaceutical companies.

(ii) To compare the financial performance of the selected Indian pharmaceutical companies

4. Research Methodology

One of the finest approaches for separating two or more groups with equal members is multivariate discriminant analysis, which derives an index score (Balcaen & Ooghe, 2006). With an emphasis on Indian pharmaceutical companies, this study evaluates the effectiveness of the original Z-Score model in categorizing bankrupt and non-bankrupt enterprises in India. The model is updated using broad secondary data and used as a standard to evaluate how different variables affect Indian pharmaceutical companies' accuracy. The study makes a contribution by focusing on an Indian context rather than just applying a model or re-estimating data from global (Altman, E. I., Iwanicz-Drozdowska, et al. 2017).

4.1 Sample of the study

This study uses secondary data those are collected from their annual reports with the help of Capitalline and selected companies' official websites. In this study, the researcher has focused on the top five Indian pharmaceutical companies namely Cipla Ltd., Divis Laboratories Ltd., Torrent Pharmaceutical Ltd., Zydus Lifescience Ltd., and Abbot India Ltd. for a period of five years from 2018-19 to 2022-23.

4.2 Analyzing Components and its Financial Difficulties

To determine whether someone is in financial distress, various criteria might be used. A firm in financial hardship is likely to make a default on its creditors shortly, either financial or operational. A company's existence is tough during this time. Delayed payments to suppliers, exceeding credit limits, missed payments of installments to the bank, missed payments of statutory obligations, eroding share values, staff leaving the company, decreased capacity utilization, and declining market reputation are all signs of financial trouble. A corporation may be in financial hardship for a variety of internal and external reasons, including incompetent management, excessive fixed asset investment, an unreasonable price structure, subpar customer service, inaccurate demand estimates, etc. Similar external influences include government regulations, the introduction of more competitors, etc. Numerous ratios, including the interest coverage ratio, debt service coverage ratio, debt equity ratio, short-term debt to current assets, short-term debt to cash from operations, and others, can be calculated to determine such a situation. In the past, experts worked

on this problem to identify the early warning indications of corporate trouble so that proper action might be taken. In our study, Altaman's Z score model, which considers five crucial financial areas and focuses on five financial parameters that indicate whether a company would file for bankruptcy, was utilized to identify financial difficulty. Numerous publications focus on financial indicators that point to financial difficulty in the company and early warning signs. Along with financial concerns, other managerial factors that are significant contributors to those organizations' financial problems are the focus of this article.

4.3 An Overview of Altman Z-score Model

Altman's Z-score model is one of the most usable models for evaluating a company's financial soundness, which has gained widespread acceptance in the management community. This model created by Altman is an excellent tool for assessing credit risk (Pardeshi, B., & Thorat, H. 2015). In the beginning, the inquiry chose 22 correlations or elements from 66 firms' published financial reports in the USA for evaluation based on their frequency in the text and relevance to the investigation. Initially divided into five categories based on standard proportions (liquidity, activity, leverage, solvency, and profitability), Five criteria were chosen from a unique list of 22 components based on a variety of models that take into account their factual importance, level of model commitment, relationships between variables, insightful precision, and the investigator's judgment.

The following is a summary of that study's final findings: Equation represents the Z Score guide's final result.

$$\zeta = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X4$$

Where:

Zeta (ζ) is the Altman's Z-score

X1 is the Working Capital/Total Assets ratio

X2 is the Retained Earnings/Total Assets ratio

X3 is the Earnings Before Interest and Tax/Total Assets ratio

X4 is the Market Value of Equity/Total Liabilities ratio

X5 is the Total Sales/Total Assets ratio

Altman (1968) assessed the Z score results after completing his investigation as follows:

If

Table-1

Z <1.8	Highly Risk (Red Zone)	There is a very high probability of insolvency of the company.
1.8 < Z < 3	Grey Zone	There is a very poor financial performance and a high risk of insolvency of the company.
Z > 3	Green Zone	There is a strong financial performance and a low risk of insolvency.

4.4 Analysis and Interpretation of Data

X1: A greater X1 value represents the company's liquidity position. Net Working Capital is contrasted with All Assets. Combining fixed assets with working capital is crucial for any firm. How much of the overall assets are allocated to fixed assets and how much to working capital becomes crucial. If a company has enough net working capital, it is a very good sign because the airline industry requires a lot of ready cash. After all, salaries, repairs, maintenance of aircraft, and fuel bills are daily expenses. Indigo is now the only business that has enough cash on hand and the ability to raise money at a rate that will allow it to survive a pandemic.

X2: In this, retained earnings are discussed about total assets. It describes the relationship between these two and briefly discusses the company's previous performance. accumulated profits that helped to generate the company's reserves and surplus and, ultimately, its total assets.

X3: Operating profit is the lifeblood of any company. It shows how effectively management is managing the company to maximize the profit from the primary business activity. Additionally, depending on the type of the firm, it shows the overall operating margins that can be generated. To produce operating profits, it also emphasizes investments in Total Assets. This ratio has been given the most weight possible by Altman.

X4: This ratio discusses the relationship between market capitalization and external liabilities. It displays the value added to company shares through market capitalization and the total amount of outside investment.

X5: This ratio emphasizes the usage of all assets, including current assets, intangible fixed assets, and physical fixed assets, to generate the greatest number of sales.

Graphical Representation of the X Components of Different Indian Pharmaceutical Companies
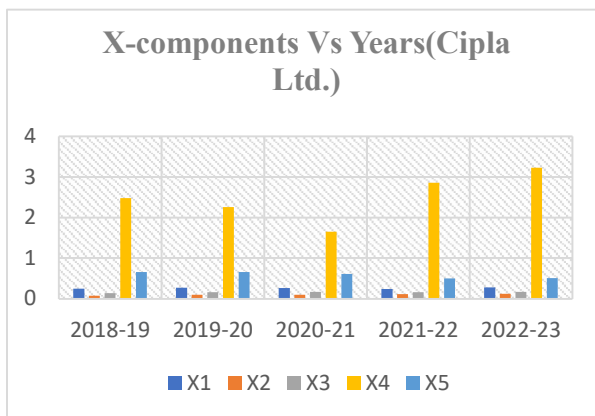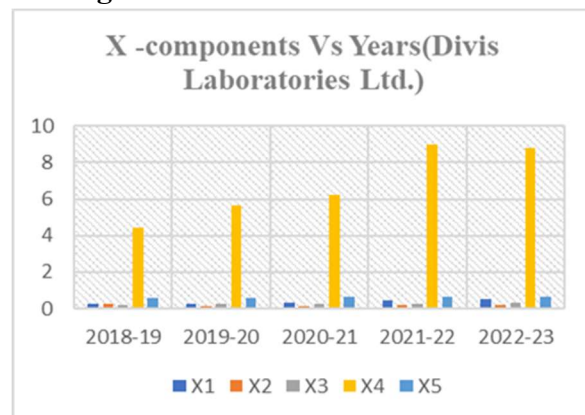
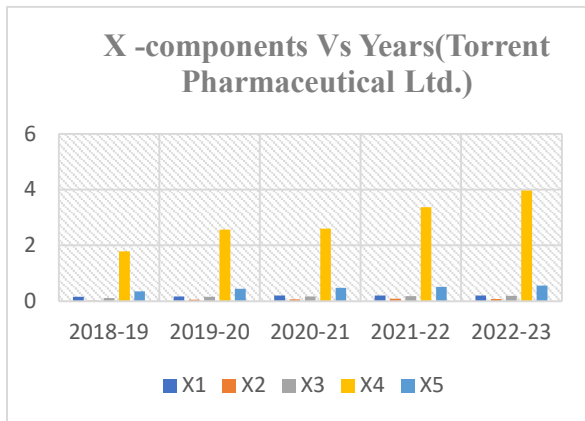**Figure-1**

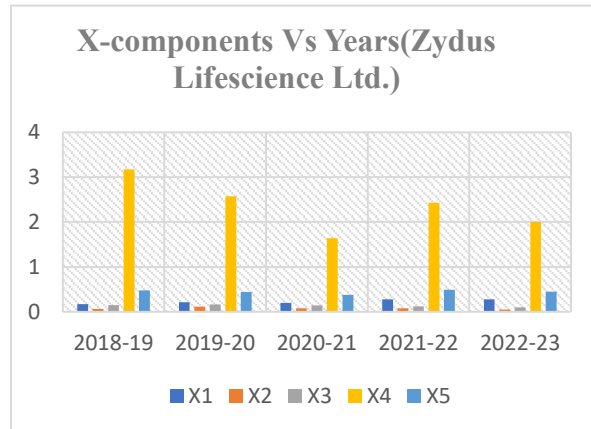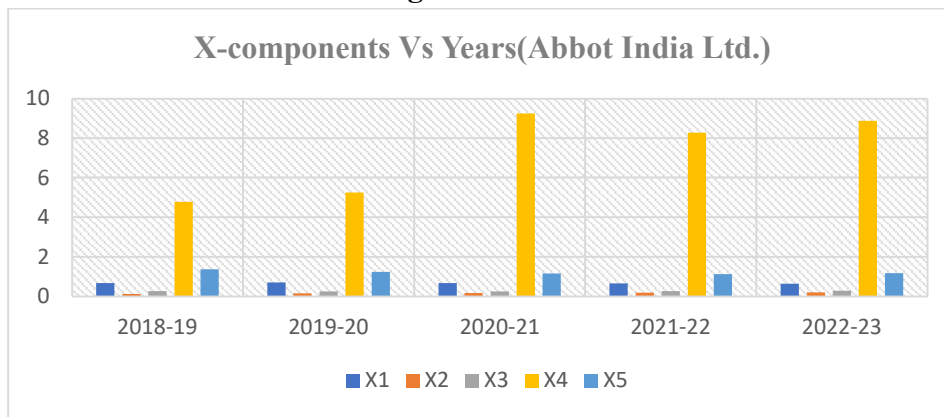**Figure-2**

Figure-3

Figure-4

Figure-5

All the above figures have been represented by X components that are related to the Altman Z-score. All the above figures present different Indian pharmaceutical companies with a comparison of years.

5. Result and Discussion

In this section, the researcher analyzes collected data and interpretation of analyzed data. After analyzing and interpreting, the researcher has found which Indian pharmaceutical companies have the best performance among selected Indian pharmaceutical companies.

Table No 2

Analysis of Altman Z-score

Altman's Z-score for Indian Pharmaceutical Companies (Health Care Sector)								
Name of the Company	Year	X1	X2	X3	X4	X5	Z-score	Zone
Cipla Ltd.	2018-19	0.25	0.07	0.14	2.48	0.66	7.17	Safe Zone
	2019-20	0.27	0.11	0.16	2.26	0.66	3.01	Safe Zone

	2020-21	0.26	0.11	0.17	1.65	0.61	2.61	Grey Zone
	2021-22	0.24	0.11	0.16	2.86	0.50	3.35	Safe Zone
	2022-23	0.28	0.12	0.17	3.23	0.51	3.51	Safe Zone
Divis Laboratories Ltd.	2018-19	0.28	0.29	0.20	4.42	0.56	4.32	Safe Zone
	2019-20	0.29	0.16	0.25	5.62	0.61	5.38	Safe Zone
	2020-21	0.30	0.11	0.24	6.20	0.62	5.65	Safe Zone
	2021-22	0.44	0.18	0.29	8.98	0.63	7.76	Safe Zone
	2022-23	0.50	0.22	0.30	8.78	0.67	7.84	Safe Zone
Torrent Pharmaceutical Ltd.	2018-19	0.16	0.02	0.11	1.79	0.36	2.02	Grey Zone
	2019-20	0.17	0.06	0.16	2.57	0.45	2.81	Grey Zone
	2020-21	0.21	0.07	0.17	2.60	0.48	2.95	Grey Zone
	2021-22	0.21	0.09	0.18	3.37	0.51	3.50	Safe Zone
	2022-23	0.21	0.08	0.20	3.96	0.56	3.96	Safe Zone

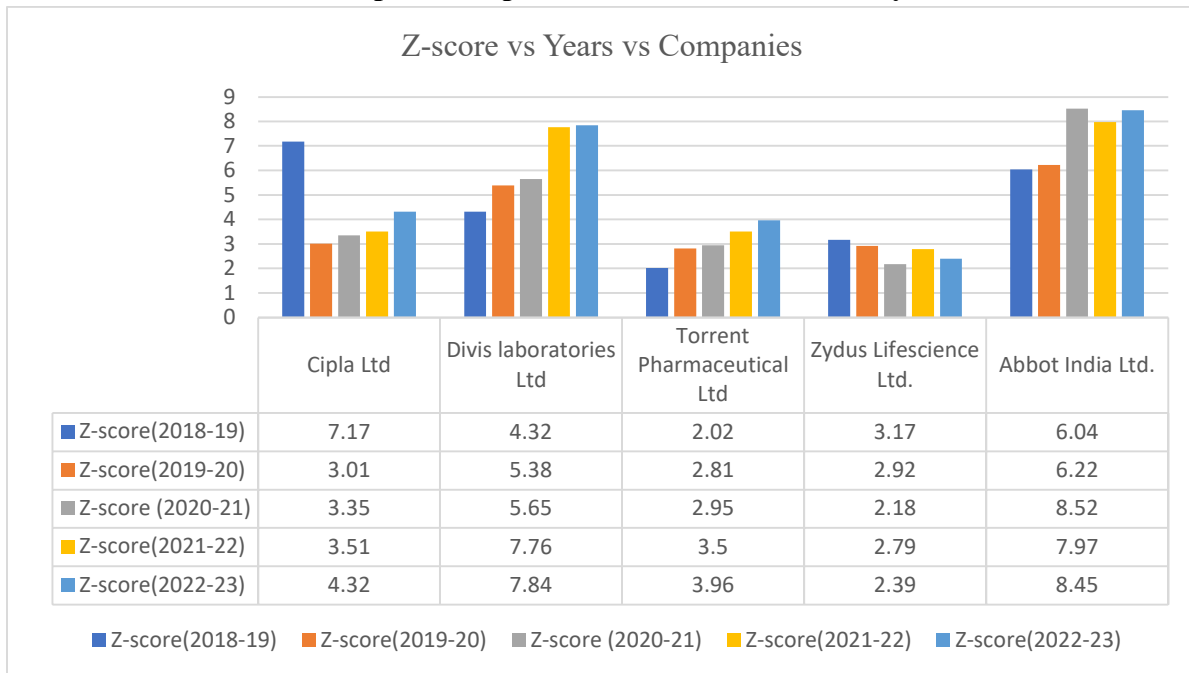|								
Zydus Lifescience Ltd.	2018-19	0.17	0.06	0.15	3.17	0.48	3.17	Safe Zone
	2019-20	0.21	0.11	0.16	2.57	0.44	2.92	Grey Zone
	2020-21	0.20	0.08	0.14	1.64	0.38	2.18	Grey Zone
	2021-22	0.28	0.08	0.12	2.43	0.49	2.79	Grey Zone
	2022-23	0.28	0.05	0.10	2.00	0.45	2.39	Grey Zone
Abbot India Ltd.	2018-19	0.66	0.12	0.26	4.77	1.36	6.04	Safe Zone
	2019-20	0.69	0.15	0.24	5.25	1.24	6.22	Safe Zone
	2020-21	0.66	0.17	0.24	9.24	1.15	8.52	Safe Zone
	2021-22	0.65	0.18	0.26	8.27	1.12	7.97	Safe Zone
	2022-23	0.64	0.19	0.28	8.88	1.16	8.45	Safe Zone

Sources: *self-analysis by researcher*

Table 2 presents Altman's Z-score values for several Indian pharmaceutical companies in the Health Care sector for five years from 2018-19 to 2022-23. Altman's Z-score is a financial metric that combines multiple financial ratios to help assess a company's financial health and the likelihood of bankruptcy.

Firstly, focuses on Cipla Ltd which is given good financial performance among respected years with the Z-scores of respected five years are 7.17, 3.01, 2.61, 3.35, and 3.51 where the company lies in the safe zone in all years except in the year 2020-21 where the company lies in the grey zone. Divis Laboratories Ltd has had the best financial performance among all the selected years with Z-scores of 4.32, 5.38, 5.65, 7.76, and 7.84 in all selected respective years, and the company

lies in the safe zone. Torrent Pharmaceutical Ltd has not had good but average financial performance in the selected years with the Z-scores of 2.02, 2.81, 2.95, 3.50, and 3.96 in the respective years of the company and the company lies in the grey zone of the first three years 2018-19, 219-20, and 2020-21 and the rest of two years 2021-22 and 2022-23, the company lies in the safe zone. Zydus Lifescience Ltd has the worst financial performance of selected years except 2018-19 with a Z-score of 3.17 and lies in the safe zone for the rest of the four years, the company lies in the grey zone with the Z-scores of 2.92, 2.18, 2.79, and 2.39 in the respective years. Abbot India Ltd has the best financial performance among all selected Indian pharmaceutical companies with the Z-scores of 6.04, 6.22, 8.52, 7.97, and 8.45 in the respective years, the company lies in the safe zone in all selected years. Cipla Ltd. and Divis Laboratories Ltd. have consistently maintained a safe financial position. Torrent Pharmaceutical Ltd and Zydus Lifescience Ltd have shown moderate financial stability, with some improvements in recent years. Abbot India Ltd. has a strong and stable financial position, remaining in the safe zone consistently.

Figure-6
Graphical Representation of Z-score Analysis

Z-score vs Years vs Companies

	Cipla Ltd	Divis laboratories Ltd	Torrent Pharmaceutical Ltd	Zydus Lifescience Ltd.	Abbot India Ltd.
Z-score(2018-19)	7.17	4.32	2.02	3.17	6.04
Z-score(2019-20)	3.01	5.38	2.81	2.92	6.22
Z-score (2020-21)	3.35	5.65	2.95	2.18	8.52
Z-score(2021-22)	3.51	7.76	3.5	2.79	7.97
Z-score(2022-23)	4.32	7.84	3.96	2.39	8.45

In Figure no 6, the researcher focuses on a comparison among three factors namely the Z-score, the company, and the years. Figure no 6 indicates that in all selected respective years among the five selected Indian pharmaceutical companies, two companies namely Torrent Pharmaceutical and Zydus lifescience have not had good financial performance in all selected years, and the rest of all three Indian pharmaceutical companies have good financial performance in all the selected years.

Figure-7
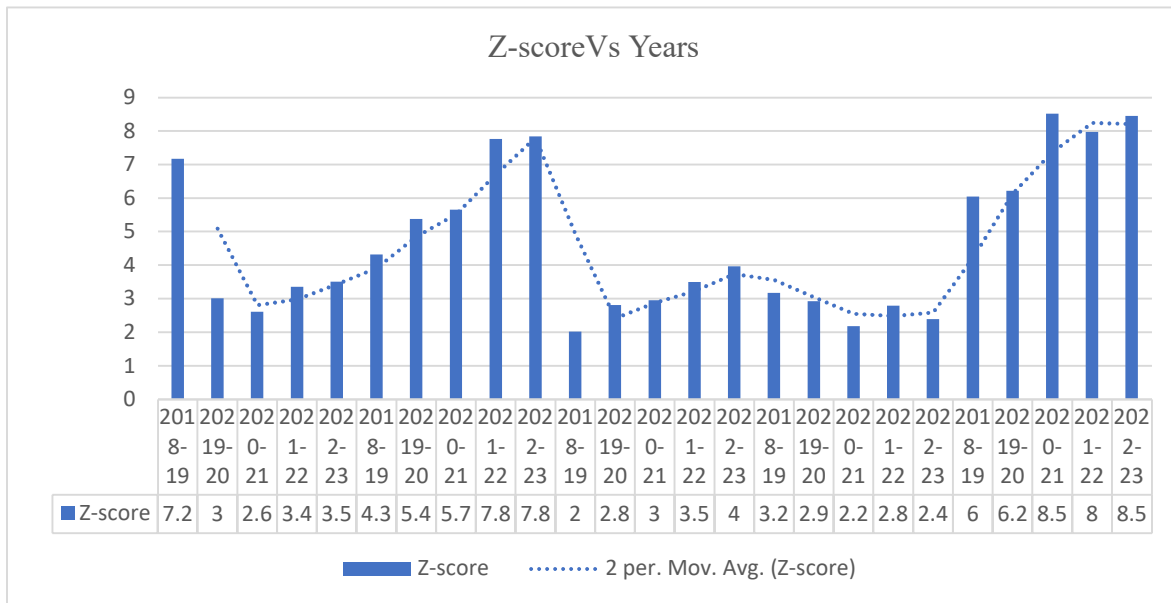**Graphical Representation of Z-Score Vs Years**

In

Figure no 7, the researcher focuses on the comparison between two factors of the study one is the Z-score and another is the years with a line graph. In this figure, the researcher also focuses on five selected Indian pharmaceutical companies' Z-scores in the selected five years the lining graph clearly indicates the financial performance of the selected five Indian pharmaceutical companies and also indicates which companies lie where it means the position of the companies according to their financial performance in the respective years.

6. Limitations and Suggestions of the Study

The study on Indian pharmaceutical companies' financial performance using Altman's Z-score model has limitations, including data reliability, a limited sample size, reliance on a single model, a short data period, and an inability to account for external factors. To improve, the study should include a diverse sample, incorporate qualitative data, extend the analysis to a longer timeframe, compare with industry benchmarks, conduct sensitivity analyses, conduct qualitative research, analyze external factors, and provide recommendations for companies. By addressing these limitations and incorporating these suggestions, the study can provide more valuable insights into the financial health of Indian pharmaceutical companies using the Z-score model. By incorporating these suggestions, the study can enhance its rigor and provide more valuable insights into the industry's financial health.

7. Conclusion

pharmaceutical sector in India, the study underscores the significance of maintaining high-quality standards, balancing innovation with affordability, and investing in research and development. By learning from the financial trajectories of these selected companies, pharmaceutical firms can make informed decisions to enhance their financial performance, contribute to the industry's growth, and ultimately provide better healthcare solutions to the population. The study emphasizes the critical role of financial prudence, effective management, and strategic planning in ensuring the sustainability of pharmaceutical companies. It highlights the importance of constant vigilance

and proactive measures to address financial challenges, especially in a dynamic and competitive industry like pharmaceuticals. The study conducted a comprehensive analysis of the financial performance of selected Indian pharmaceutical companies using Altman's Z-Score model over five years. The findings revealed valuable insights into the financial health of these companies and their susceptibility to financial distress or bankruptcy. Cipla Ltd. and Divis Laboratories Ltd. consistently demonstrated a safe financial position, reflecting their strong financial stability and prudent management practices. These companies have maintained their financial health, indicating effective strategies in dealing with market challenges and economic fluctuations. Torrent Pharmaceutical Ltd. and Zydus Lifescience Ltd. exhibited moderate financial stability, with fluctuations in their Z-Scores over the years. Although they showed improvements in recent years, their positions in the grey zone during certain periods suggest a need for continuous efforts to enhance their financial resilience. On the other hand, Abbot India Ltd. emerged as the top performer among the selected companies, consistently maintaining a strong and stable financial position in the safe zone throughout the study period. This remarkable performance indicates robust financial management, strategic decision-making, and adaptability to market dynamics.

References

Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance*, *23*(4), 589-609.

Altman, E. I., Iwanicz-Drozdowska, M., Laitinen, E. K., & Suvas, A. (2014). Distressed firm and bankruptcy prediction in an international context: A review and empirical analysis of Altman's Z-score model. Available at SSRN 2536340.

Altman, E. I., Iwanicz-Drozdowska, M., Laitinen, E. K., & Suvas, A. (2017). Financial distress prediction in an international context: A review and empirical analysis of Altman's Z-score model. Journal of International Financial Management & Accounting, 28(2), 131-171.

Anjum, S. (2012). Business bankruptcy prediction models: A significant study of the Altman's Z-score model. Available at SSRN 2128475.

Azam, A. Role of Startup India in Economic Development of India.

Azam, A., & Ahmad, N. EXPERIENCE OF FINANCIAL HEALTH OF SELECT INDIAN OIL AND GAS COMPANIES BY USING ZMIJEWSKI X-SCORE MODEL.

Azam, A., & Begum, A. Detecting Financial Statement Manipulation in Selected Indian Telecom Companies Using Beneish M-Score Model.

Azam, A., Khan, I., Fahad, M. S., & Akhtar, M. A. (2023). Prediction of Insolvency by Using Altman Z-score Model: A Study of Selected Indian Private Banks. Boletin de Literatura Oral-Tradition Oral Literature, 10(1), 684-695.

Azam, A., Mulla, N. A. I., & Safiuddin, S. K. MEASURING FINANCIAL HEALTH THROUGH SELECTED INSOLVENCY PREDICTION MODELS-A REVIEW OF SELECTED STUDIES.

Azam, A., & Mulla, N. A. I. ENVIRONMENTAL ACCOUNTING A BASIS OF CORPORATE SUSTAINABILITY IN INDIA.

Balcaen S, Ooghe H (2006) 35 years of studies on business failure: An overview of the classic statistical methodologies and their related problems. Br Account Rev 38: 63–93.

Beaver, W. H. (1966). Financial Ratios as Predictors of Failure. Journal of Accounting Research, 4, 71. https://doi.org/10.2307/2490171

Buzgurescu, O. L. P., & Elena, N. (2020). Bankruptcy Risk Prediction in Assuring the Financial Performance of Romanian Industrial Companies. Contemporary Issues in Business Economics and Finance, 1(1), 1. https://doi.org/https://doi.org/10.1108/S1569-375920200000104003.

Cındık, Z., & Armutlulu, I. H. (2021). A revision of Altman Z-Score model and a comparative analysis of Turkish companies' financial distress prediction. National Accounting Review, 3(2), 237-255.

Festa, G., Rossi, M., Kolte, A., & Marinelli, L. (2021). The contribution of intellectual capital to financial stability in Indian pharmaceutical companies. Journal of Intellectual Capital, 22(2), 337-359.

Frew, S. E., Rezaie, R., Sammut, S. M., Ray, M., Daar, A. S., & Singer, P. A. (2007). India's health biotech sector at a crossroads. Nature biotechnology, 25(4), 403-417.

GUPTA, A. (2018). Insolvency and bankruptcy code, 2016: a paradigm shift within insolvency laws in India. The Copenhagen Journal of Asian Studies, 36(2), 75-99.

Grace, C. (2004). The effect of changing intellectual property on pharmaceutical industry prospects in India and China. DFID Health Systems Resource Centre, 1-68.

https://www.thehindu.com/news/national/explained-what-is-the-insolvency-and-bankruptcy-code-ibc-and-where-does-it-stand-after-more-than-five-years-of-being-in-place/article65969421.ece

Khan, I., Farooq, M., & Azam, A. A Study on Carbon Credits Market and Its Accounting Implication in India.

MacCarthy, J. (2017). Using Altman Z-score and Beneish M-score models to detect financial fraud and corporate failure: A case study of Enron Corporation. International Journal of Finance and Accounting, 6(6), 159-166.

Manaseer, S., & Al-Oshaibat, S. D. (2018). Validity of Altman Z-score model to predict financial failure: Evidence from Jordan. International Journal of Economics and Finance, 10(8).

Mohammed, S. (2016). Bankruptcy prediction by using the Altman Z-score model in Oman: A case study of Raysut cement company SAOG and its subsidiaries. Australasian Accounting, Business and Finance Journal, 10(4), 70-80.

Mol, R., Singh, B., Chattu, V. K., Kaur, J., & Singh, B. (2022). India's health diplomacy as a soft power tool towards Africa: humanitarian and geopolitical analysis. Journal of Asian and African Studies, 57(6), 1109-1125.

Panigrahi, C. M. A. (2019). Validity of Altman's 'z'score model in predicting financial distress of pharmaceutical companies. NMIMS journal of economics and public policy, 4(1).

Pardeshi, B., & Thorat, H. (2015). Evaluating the Financial Health of Central Public Sector Enterprises in India through Z Score Model. In Twelfth AIMS International Conference on Management, 2015.

Paule-Vianez, J., Gutiérrez-Fernández, M., & Coca-Pérez, J. (2020). Prediction of financial distress in the Spanish banking system: An application using artificial neural networks. Applied Economic Analysis, 28(82), 69–87. https://doi.org/https://doi.org/10.1108/AEA-10-2019-0039.

Prasetiyani, E., & Sofyan, M. (2020). Bankruptcy analysis using Altman Z-score model and Springate model in retail trading company listed in Indonesia Stock Exchange. Ilomata International Journal of Tax and Accounting, 1(3), 139-144.

Sane, R. (2019). The way forward for personal insolvency in the Indian Insolvency and Bankruptcy Code. Available at SSRN 3309470.

Sarwal, R., Prasad, U., Gopal, K. M., Kalal, S., Kaur, D., Kumar, A., ... & Sharma, J. (2021). Investment opportunities in India's healthcare sector.

Sultana, S., Azam, A., & Shareef, M. S. Perception of Borrowers Towards Housing Finance A-Case Study of Select District in Housing Finance Institution.

Thai, S. B., Goh, H. H., HengTeh, B., Wong, J., & San Ong, T. (2014). A revisited of altman z-score model for companies listed in Bursa Malaysia. International Journal of Business and Social Science, 5(12).

Tron, A. (2021). Common Characteristics of Firms in Financial Distress and Prediction of Bankruptcy or Recovery: An Empirical Research Carried out in Italy. Emerald Publishing Limited, 1(1), 67–99 https://doi.org/https://doi.org/10.1108/978-1-83982-980-220211005.