

Predicting Bankruptcy of Pharmaceutical Companies Using The Altman Z-Score and Grover Methods

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Abstract

The main objective of this study is to evaluate and contrast the effectiveness of two financial distress prediction models to predict bankruptcy, namely Altman Z-Score and Grover. The sampling method used was purposive sampling, where the samples were purposively selected from the population of pharmaceutical companies listed on the Indonesia Stock Exchange (IDX), which was listed in 2018. The results showed that the evaluated predictive models were able to forecast the incidence of financial distress to predict bankruptcy. In terms of accuracy, the Altman Z-Score model stands out as the most effective than the Grove model, with an accuracy rate of 86.67%. It is followed by the Grover model, which occupies the second position with an accuracy rate of 55.56%.

Keywords: Altman Z-Score, Grover, Financial Distress

INTRODUCTION

The Indonesian government has officially announced the revocation of the COVID-19 pandemic status and entered the endemic period. The decision was taken in line with the revocation of the COVID-19 Public Health Emergency of International Concern (PHEIC) status set by the World Health Organisation (WHO). The decision also considers the daily number of COVID-19 cases in the country, which is close to zero. The revocation of this status provides new hope, especially for the business world, for an increase in the economy. The COVID-19 pandemic has had a very significant impact on the Indonesian economy, ranging from changes in the world supply chain to a decrease in foreign investment in Indonesia. Quoted from <https://www.djkn.kemenkeu.go.id/>, the decline can be seen through a slowdown in economic growth, which fell from 5.02 percent in 2019 to 2.97 percent in 2020. The slowdown in economic growth was also followed by an increase in unemployment, which, according to World Bank data, increased from 5.28 percent in 2019 to 7.07 percent in 2020. At the end of the pandemic period, it is expected that the business world will rise again, and social life will stretch again after there are no more extended restrictions on movement.

The COVID-19 pandemic has had a considerable impact and influence throughout the world, not only in Indonesia. (Maharani & Marheni, 2022) It concluded that economic recovery after the COVID-19 pandemic needs to be considered and resolved seriously and thoroughly,

considering that this virus can cause a long-term crisis in the financial and health sectors. This means that the government needs to carefully make fiscal and monetary policies in an effort to restore the national economy and prevent a deep monetary crisis. The pandemic has brought about an economic crisis in various countries as a result of a decrease in income, reduced purchasing power, layoffs, and restrictions on social activities.

Similarly, industry players or entrepreneurs welcomed the increase in investment fluctuations because it was expected to increase sales of their products, which declined due to the pandemic, and economic growth, which slowed down during the pandemic. They certainly hope that the increase in economic growth can increase people's purchasing power and suppress inflation. One of the industries affected by the pandemic is pharmaceuticals. As quoted from the page <https://www.gpfarmasi.id/>, the pharmaceutical industry is facing a decrease in demand for products that are not related to handling COVID-19. This is also exacerbated by the fact that more than 90% of the raw materials for the national pharmaceutical industry still depend on imported products. The closure of access to raw materials from China and India due to lockdowns certainly disrupts the business processes of pharmaceutical companies. Another problem is that the number of chronic disease patients visiting hospitals has dropped significantly, and dentist services have also been temporarily closed, so some products that are not directly related to COVID-19 are growing slowly.

The Indonesian government made various efforts to restore the economic sector, as quoted (Malik, 2022) by creating the National Economic Recovery Programme (PEN). In its implementation, Indonesia established bilateral cooperation with China. As partners for more than 70 years, China and Indonesia have collaborated to restore the Indonesian economy by creating herd immunity through vaccination and increasing investment and export-import. With this cooperation, it is hoped that the pharmaceutical sector will also rise because most of the raw materials will be imported from China.

Shares of pharmaceutical issuers experienced a sharp decline along with the endemic period. Competition between industries is also suspected to have worsened the performance of pharmaceutical issuers. Quoted from <https://investasi.kontan.co.id/>, on 4 October 2023, the share price of PT Kalbe Farma Tbk (KLBF) was recorded to have fallen 15.55% since the beginning of the year to Rp 1,765 per share. Meanwhile, the share price of PT Industri Jamu dan Farmasi Sido Muncul Tbk (SIDO) fell 25.83% in the same period to IDR 560 per share. The share price of PT Phapros Tbk (PEHA) fell 5.84% since the beginning of the year to Rp

645 per share. The share price of PT Kimia Farma Tbk (KAEF) slipped 27.65% since the start of the year to Rp 785 per share.

The performance of pharmaceutical companies has declined due to rising costs of production and distribution factors due to inflation, the energy crisis, and the weakening exchange rate. Several pharmaceutical companies experienced price increases in raw materials, labor, transportation, and taxes, which put pressure on profit margins. Changes in people's lifestyles also contributed to the decline in demand for pharmaceutical products. Some pharmaceutical companies experienced a decrease in sales of certain products, such as cold, cough, or fever medicines, because people prefer to prevent rather than treat diseases. Research conducted by (Fitriyani, 2022) concluded that bankruptcy prediction methods can affect stock prices if we look at the indicators that can be used to predict bankruptcy, they are financial statements. (Masdiantini & Warasniasih, 2020) They argue that financial statements are a tool to determine the most accurate bankruptcy prediction model for predicting potential bankruptcy.

The financial performance records of two state-owned issuers engaged in the pharmaceutical sector were not good throughout 2022. Quoted from <https://www.kompas.id/>, PT Indofarma Tbk posted net sales that slipped by 60.5 percent. Meanwhile, PT Kimia Farma Tbk lost up to Rp 170 billion. The pandemic that has hit has also depressed the performance of the pharmaceutical sector. Kimia Farma's financial position is reversed with the situation in 2021. At that time, Kimia Farma posted a net profit of IDR 302.27 billion. President Director of Kimia Farma David Utama said that the COVID-19 pandemic provides both opportunities and challenges to the health industry, including Kimia Farma. The results showed that there was no significant difference in the ROA and OPM financial performance ratios and stock prices before and after COVID-19. Still, there was a significant difference in the NPM ratio before and after COVID-19. Research conducted by Aini, 2022) showed that, on average, PT Kalbe Farma Tbk is included in the category of healthy companies and avoided bankruptcy during the 2011- 2020 period.

For the Z-Score model, only 2011 was in the grey area category, and then 2012 to 2020 was in the healthy category. For the S-Score and X-Score models from 2011 to 2020, the healthy category was included. The financial health achieved by PT Kalbe Farma Tbk is supported by increased sales, high total assets, and stable working capital every year. Meanwhile, the results of research from (Siswanto & Romadon, 2021), based on the results of their analysis, the Zmijewski model predicts companies that do not experience the largest bankruptcy as many as

43 samples and seven companies that are indicated not to experience bankruptcy. Next is Altman, with as many as 42 samples and seven companies that are indicated not to experience bankruptcy. The Springate model predicts companies that do not experience the least bankruptcy of 36 samples and six companies that are indicated not to experience bankruptcy in pharmaceutical companies for the period 2015-2020. The Zmijewski model is the most suitable model for predicting bankruptcy in pharmaceutical companies 2015-2020.

This study attempts to conduct a bankruptcy analysis on pharmaceutical companies, both state-owned and private, listed on the Indonesia Stock Exchange for the 2018-2022 financial reporting period, meaning the period before and during the COVID-19 pandemic. Analysis for bankruptcy prediction is expected to help companies anticipate the possibility that the company will experience bankruptcy caused by financial problems reflected through annual financial reports. This analysis can also help investors and potential investors consider buying or releasing their shares so as not to be trapped in losses because the company is unable to pay interest or dividends.

LITERATURE REVIEW

Bankruptcy Analysis

Financial Distress refers to a critical condition in which a company faces challenges in meeting its financial commitments to creditors. It typically involves issues with operational activities and a sustained decline in financial performance. If not addressed, it can lead to bankruptcy and significant financial losses for investors and creditors (Darmawan, 2022). Financial distress and bankruptcy analysis are crucial aspects of corporate finance and risk management. They involve assessing a company's financial health and the likelihood of it facing financial difficulties or declaring bankruptcy. On the other hand, bankruptcy analysis focuses on evaluating the factors that could lead a company to file for bankruptcy protection. This analysis considers the company's financial condition, debt structure, industry trends, and potential legal and regulatory issues. Both analyses are essential for investors, creditors, and other stakeholders to make informed decisions about their involvement with a company. They help assess the risks associated with investing in or lending to a particular company and can guide strategic decisions to mitigate these risks.

Financial distress analysis typically includes examining various financial metrics, such as liquidity ratios, solvency ratios, profitability ratios, and cash flow trends. These metrics help

identify warning signs indicating that a company may be struggling to meet its financial obligations.

According to Diana and Hidayat (2023), bankruptcy represents the ultimate failure of a company, indicating its inability to generate profits from its operations to sustain its business activities. Bankruptcy can be further understood as the state of a company that is incapable of meeting its financial obligations. Thus, it can be inferred that bankruptcy signifies a company's failure both in generating profits and in fulfilling its financial commitments.

Altman Z-Score Model

The Altman (1968) model in (Melia & Febrimaiko, 2023) on five financial ratios that are calculated using data from a company's financial statements : (1) Working Capital/Total Assets (WC/TA): Measures the proportion of a company's total assets financed by its short-term assets. A higher ratio indicates a more vital ability to cover short-term liabilities. (2) Retained Earnings/Total Assets (RE/TA): Indicates the proportion of a company's total assets financed by its retained earnings. A higher ratio suggests a more stable financial position. (3) Earnings Before Interest and Taxes/Total Assets (EBIT/TA): Reflects the company's ability to generate earnings from its assets. A higher ratio indicates higher profitability. (4) Market Value of Equity/Book Value of Total Liabilities (MV/BV): Measures the market's perception of the company's value relative to its liabilities. A lower ratio may indicate higher financial risk. (5) Sales/Total Assets (S/TA): Indicates the efficiency of asset utilization in generating sales. A higher ratio suggests better asset utilization.

Until now, Altman Z-Score is still more widely used by researchers, practitioners, and academics in the field of accounting. The Altman Z-Score model classifies companies with scores < 1.23 as potentially bankrupt. Scores of $1.23 - 2.90$ are classified as grey areas, while companies with scores > 2.90 are classified as companies that do not have the potential for bankruptcy. The Altman Z-score is widely used by investors, analysts, and creditors to assess companies' financial health and bankruptcy risk. However, it is essential to note that while the Z-score provides a useful indication, it is not infallible and should be used in conjunction with other financial analysis tools and considerations.

Grover G-Score Method

Jeffrey S. Grover consistently developed the Altman Z-Score bankruptcy prediction model built by Altman in 1968. The sample used by Grover in his research is in accordance with the Altman Z-Score model, which sets a balanced number of samples with bankrupt and non-bankrupt companies. Grover initially designed and re-evaluated the Altman Z-Score model

by adding thirteen new financial ratios. In Grover's method, there are ratios that are deleted, namely the ratio of the company's market value and the ratio of retained earnings to total assets and adding the ROA ratio. Grover conducted research by taking a sample of 35 bankrupt companies and 35 non-bankrupt companies in the period 1982- 1996. The results of the study showed an accuracy of 97.7%, indicating that the Grover method is suitable for detecting financial distress in companies (Pratiwi et al., 2023). The Grover model categorizes companies in a state of bankruptcy with a score less or equal to -0.02 ($G \leq -0.02$). Meanwhile, the value for companies classified as not bankrupt is more or equal to 0.01 ($G \geq 0.01$).

RESEARCH METHOD

The method used in this research is a quantitative method that aims to test the models that have been used previously to predict the bankruptcy of a company and get the results of the highest level of accuracy between the Altman Z-score Model and the Grover G-score Method. The data analysis used is a descriptive statistical analysis to obtain an overview of the data that has been collected without making general conclusions. This study uses secondary data taken through the Indonesia Stock Exchange (IDX) website, namely www.idx.co.id, and the website of each company. The population in this study is Pharmaceutical Sub-Sector Manufacturing Companies listed on the Indonesia Stock Exchange (IDX) for the period 2018 - 2022. Until the research was carried out, the population of pharmaceutical companies listed on the Indonesia Stock Exchange, there were nine companies in the period 2018 - 2022. The sample in this study used a purposive sampling method, with the sampling criteria being: (1) pharmaceutical sub-sector manufacturing companies listed on the Indonesia Stock Exchange for the period 2018 - 2022; (2) pharmaceutical sub-sector manufacturing companies with Initial Public Offerings (IPO) on the Indonesia Stock Exchange during the period 2018 - 2022; (3) pharmaceutical sub-sector manufacturing companies that report their financial statements consecutively for the period 2018 - 2022. Based on these criteria, the total sample obtained was nine companies, with a total of 45 data processed.

Furthermore, object-specific criteria are used to pre-determine the bankruptcy status of a company. These criteria classify the sample into two categories: companies that factually show symptoms of financial distress and companies that are identified as financially healthy. An indicator of a company's financial distress is expressed by the presence of negative operating cash flow. Previous studies conducted by Laksmi (Rizaldi, 2023) highlighted that cash flow has a positive average effect on the value of the Interest Coverage Ratio. In addition, higher

cash flow values correlate with an increase in the value of the Interest Coverage Ratio, suggesting that greater cash flow can reduce the likelihood of financial distress. In this study, out of a total of 45 samples analyzed from 2018 to 2023, 25 companies are categorized as experiencing financial distress, while the remaining 20 companies are considered not experiencing economic distress.

The list of companies sampled in this study are :

Table 1.
List of Pharmaceutical Companies Listed on IDX 2018-2023

No.	Code	Company Name
1.	DVLA	Darya Varia Laboratoria, Tbk
2.	KAEF	Kimia Farma, Tbk.
3.	KLBF	Kalbe Farma, Tbk.
4.	MERK	Merck Tbk.
5.	PEHA	PT Phapros, Tbk.
6.	PYFA	Pyridam Farma, Tbk.
7.	SIDO	Sido Muncul Jamu and Pharmaceutical Industry, Tbk.
8.	TPSC	Tempo Scan Pacific, Tbk.
9.	INAF	Indofarma (Persero), Tbk.

Source: Data processing, 2023

The data collection technique in this study is secondary data with the financial statements of pharmaceutical companies listed on the IDX in 2018-2022 and uses quantitative data types in the form of numbers in financial statements. The data analysis technique used is to calculate the financial statements of pharmaceutical companies listed on the IDX in 2018- 2022 with two methods, namely the Altman method (Z-Score) and the Grover Method (G-Score). The calculation formulation of bankruptcy analysis with the Altman Z-Score method in predicting bankruptcy for manufacturing public companies is as follows:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 0.99 X_5$$

Description:

X₁: Working Capital/Total Assets

X₂: Retained Earnings/Total Assets

X₃: Earnings Before Interest and Taxes (EBIT)/Total Assets

X₄: Market Value of Equity/Book Value of Total Debt

X₅: Sales/Total Assets

The final result of the Z value calculation falls into three categories, namely:

- a. If the Z value < 1.8, then the company is in the bankrupt category.
- b. If the value is 1.8 < Z < 2.99, then the company falls into the grey area category (it cannot be determined whether the company is healthy or experiencing bankruptcy).

c. If the Z value > 2.99, then the company is in the category of not bankrupt

The formula formulated by Grover is as follows:

$$G\text{-Score} = 1.650 X_1 + 3.404 X_2 - 0.016 X_3 + 0.057$$

Description:

X₁ = Working Capital/Total Assets

X₂ = Earnings Before Interest and Taxes/Total Assets

X₃ = Net Profit/Total Assets

Grover Score model bankruptcy measurement scale:

G ≥ 0.01: The company is not potentially bankrupt.

G ≤ -0.02: The company is bankrupt

RESULT AND ANALYSIS

To describe the descriptive analysis, there is table of descriptive analysis calculations:

Table 2.
Descriptive Analysis Calculation

	N	Minimum	Maximum	Mean	Std. Deviation
WCTA	45	-0.0793	0.6887	0.2950	0.1964
RETA	45	0.0582	0.7796	0.3897	0.2273
EBITTA	45	-0.3126	0.3036	0.0609	0.0878
MVE_BVTD	45	0.0574	6.6725	2.0671	1.7250
SATA	45	0.0864	1.3130	0.4978	0.3838
ROA	45	-0.2793	0.9210	0.0595	0.1495

Source: Data processed by researchers, 2023

The table above illustrates the companies that have the highest and lowest ratio values in their financial situation from 2018 to 2023. For the *Working Capital to Total Asset* (WCTA) ratio, the company with the issuer code INAF recorded the lowest ratio among all samples in 2022, which was -0.0793, while the highest WCTA ratio was achieved by the issuer PYFA in 2021 with 0.6887. For the *Retained Earning to Total Asset* (RETA) ratio, INAF also recorded the lowest ratio among all samples in 2019 (0.0582), while the highest ratio was obtained by the issuer KLBF in 2020 (0.7796). The *Earnings Before Interest and Taxes to Total Asset* (EBIT) ratio recorded the lowest number by INAF in 2022 (-0.3126), while the highest ratio was achieved by the issuer SIDO in 2019 (0.3036). Furthermore, the issuer INAF recorded the lowest *Market Value Equity/Book Value to Total Debt* ratio in 2019 (0.0574), while the highest ratio was achieved by SIDO in 2018 (6.6725). *Sales to Total Asset* (SATA) recorded the lowest figure by

INAF in 2020 (0.0864), while the highest ratio was achieved by TSPC in 2019 (1.3130). Finally, the *return on assets* (ROA) ratio recorded the lowest value by INAF in 2022(-0.2793), while the highest was achieved by the issuer MERCK in 2018 (0.9210).

The company with the issuer code INAF consistently shows the lowest ratio in all financial measurements, so it needs further attention so that preventive action against financial difficulties can be taken immediately.

Results of Bankruptcy Analysis using the Altman Z-score Method

The following are the results of the calculation of bankruptcy analysis in pharmaceutical companies in 2018-2022 using the Altman Z-score Method:

Table 3.
Calculation of Bankruptcy Analysis with the Altman Z-score Method

IssuerCode	Year	Z-Score	Prediction	Reality	Conclusion
DVLA	2018	4.3370	Non Distress	Non Distress	Correct Prediction
	2019	4.3376	Non Distress	Non Distress	Correct Prediction
	2020	2.8103	Grey Area	Non Distress	Correct Prediction
	2021	3.0723	Non Distress	Non Distress	Correct Prediction
	2022	3.2830	Non Distress	Distress	Wrong Prediction
KAEF	2018	1.8311	Grey Area	Non Distress	Correct Prediction
	2019	1.2010	Distress	Distress	Correct Prediction
	2020	0.7110	Distress	Distress	Correct Prediction
	2021	0.7657	Distress	Distress	Correct Prediction
	2022	0.7710	Distress	Distress	Correct Prediction
KLBF	2018	6.6237	Non Distress	Non Distress	Correct Prediction
	2019	6.0659	Non Distress	Non Distress	Correct Prediction
	2020	4.5637	Non Distress	Non Distress	Correct Prediction
	2021	4.5068	Non Distress	Non Distress	Correct Prediction
	2022	4.6694	Non Distress	Non Distress	Correct Prediction
MERK	2018	1.7818	Distress	Non Distress	Correct Prediction
	2019	3.8571	Non Distress	Distress	Wrong Prediction
	2020	2.8713	Distress	Distress	Correct Prediction
	2021	3.9538	Non Distress	Non Distress	Correct Prediction
	2022	2.8326	Distress	Distress	Correct Prediction
PEHA	2018	1.7963	Distress	Distress	Correct Prediction
	2019	1.5891	Distress	Distress	Correct Prediction
	2020	0.7950	Distress	Distress	Correct Prediction
	2021	0.8569	Distress	Distress	Correct Prediction
	2022	0.9906	Distress	Distress	Correct Prediction
PYFA	2018	3.0278	Non Distress	Distress	Wrong Prediction
	2019	3.1077	Non Distress	Non Distress	Correct Prediction
	2020	2.7755	Distress	Distress	Correct Prediction
	2021	1.6650	Distress	Non Distress	Wrong Prediction
	2022	6.4282	Distress	Distress	Correct Prediction

IssuerCode	Year	Z-Score	Prediction	Reality	Conclusion
SIDO	2018	6.5670	Non Distress	Non Distress	Correct Prediction
	2019	4.3816	Non Distress	Non Distress	Correct Prediction
	2020	2.7450	Non Distress	Non Distress	Correct Prediction
	2021	2.7137	Grey Area	Non Distress	Correct Prediction
	2022	4.2143	Grey Area	Non Distress	Correct Prediction
TSPC	2018	4.3059	Non Distress	Non Distress	Correct Prediction
	2019	3.2063	Non Distress	Non Distress	Correct Prediction
	2020	3.0823	Non Distress	Non Distress	Correct Prediction
	2021	3.1039	Non Distress	Non Distress	Correct Prediction
	2022	1.5972	Non Distress	Non Distress	Correct Prediction
INAF	2018	1.5538	Distress	Distress	Correct Prediction
	2019	0.5827	Distress	Non Distress	Wrong Prediction
	2020	0.7113	Distress	Distress	Correct Prediction
	2021	0.2179	Distress	Distress	Correct Prediction
	2022	4.3370	Distress	Distress	Correct Prediction

Source: Data processed by researchers, 2023

Based on the data processing above, nine companies for five years and a sample of 45, it can be predicted that 20 company conditions are predicted to experience bankruptcy (distress), four grey conditions (a grey area), and 21 in a healthy state (nondistress). Then, compared with the actual condition of the company, it can be concluded that 39 predictions are correct and six predictions are wrong.

Bankruptcy Analysis Results using the Grover Method

The following are the results of the calculation of bankruptcy analysis in pharmaceutical companies in 2018-2022 using the Grover Method:

Table 4.
Calculation of Bankruptcy Analysis with the Grover Method

IssuerCode	Year	G-Score	Prediction	Reality	Conclusion
DVLA	2018	1905,051379	Non Distress	Non Distress	Correct Prediction
	2019	2054,516471	Non Distress	Non Distress	Correct Prediction
	2020	0,845080185	Non Distress	Non Distress	Correct Prediction
	2021	1,028045437	Non Distress	Non Distress	Correct Prediction
	2022	0,927332797	Non Distress	Distress	Wrong Prediction
KAEF	2018	0,314746357	Non Distress	Non Distress	Correct Prediction
	2019	0,060264038	Non Distress	Distress	Wrong Prediction
	2020	0,033956203	Non Distress	Distress	Wrong Prediction
	2021	0,102037293	Non Distress	Distress	Wrong Prediction
	2022	0,075597485	Non Distress	Distress	Wrong Prediction
KLBF	2018	0,815073805	Non Distress	Non Distress	Correct Prediction
	2019	0,758851081	Non Distress	Non Distress	Correct Prediction
	2020	0,781543934	Non Distress	Non Distress	Correct Prediction
	2021	0,787453248	Non Distress	Non Distress	Correct Prediction

IssuerCode	Year	G-Score	Prediction	Reality	Conclusion
	2022	0,845828641	Non Distress	Non Distress	Correct Prediction
MERK	2018	62,85091092	Non Distress	Non Distress	Correct Prediction
	2019	69,56213888	Non Distress	Distress	Wrong Prediction
	2020	0,790698695	Non Distress	Distress	Wrong Prediction
	2021	0,913151175	Non Distress	Non Distress	Correct Prediction
	2022	0,80497997	Non Distress	Distress	Wrong Prediction
PEHA	2018	0,089226018	Non Distress	Distress	Wrong Prediction
	2019	0,068562673	Non Distress	Distress	Wrong Prediction
	2020	1344,749284	Non Distress	Distress	Wrong Prediction
	2021	1468,85647	Non Distress	Distress	Wrong Prediction
	2022	682,7146087	Non Distress	Distress	Wrong Prediction
PYFA	2018	7,851786899	Non Distress	Distress	Wrong Prediction
	2019	7,214582346	Non Distress	Non Distress	Correct Prediction
	2020	1,053673397	Non Distress	Distress	Wrong Prediction
	2021	1,494149248	Non Distress	Non Distress	Correct Prediction
	2022	0,624421062	Non Distress	Distress	Wrong Prediction
SIDO	2018	15599,39291	Non Distress	Non Distress	Correct Prediction
	2019	-461442,6722	Distress	Non Distress	Wrong Prediction
	2020	0,695526827	Non Distress	Non Distress	Correct Prediction
	2021	0,551443318	Non Distress	Non Distress	Correct Prediction
	2022	0,560279489	Non Distress	Non Distress	Correct Prediction
TSPC	2018	0,704034917	Non Distress	Non Distress	Correct Prediction
	2019	0,741423476	Non Distress	Non Distress	Correct Prediction
	2020	0,769214456	Non Distress	Non Distress	Correct Prediction
	2021	0,760520609	Non Distress	Non Distress	Correct Prediction
	2022	0,794039839	Non Distress	Non Distress	Correct Prediction
INAF	2018	0,103427428	Non Distress	Distress	Wrong Prediction
	2019	0,519828184	Non Distress	Non Distress	Correct Prediction
	2020	0,344173434	Non Distress	Distress	Wrong Prediction
	2021	0,300684272	Non Distress	Distress	Wrong Prediction
	2022	-0,069232539	Distress	Distress	Correct Prediction

Source: Data processed, Researcher, 2023

Based on the data processing above, nine companies for five years and a sample of 45, it can be predicted that two company conditions are predicted to experience bankruptcy (distress) and 43 are in good health (non distress). Then, compared to the reality of the company's condition, it can be concluded that 25 predictions are correct and 20 predictions are wrong.

Comparison of bankruptcy analysis accuracy between Altman's Z-score and Grover's Analysis

Based on the results of the analysis calculations that have been stated previously, then we will compare the accuracy level of the analysis calculations on pharmaceutical

companies for the period 2018 to 2022 using Altman Z-score Analysis with Grover as follows:

Table 5.
Accuracy and Error Rate of Altman Z-score Model

Recap	Condition	Predictions		Total
		Distress	Non Distress	
Reality	Distress	17	3	20
	Non Distress	3	22	25
	Total	20	25	45
AccuracyLevel		86,67%		
Type I		6,67%		
Type II		6,67%		

Source: Data processed, Researcher, 2023

Based on the data in the table above, the accuracy level of bankruptcy analysis calculations with the Altman Z-score Method is 86.67%, meaning that the accuracy level is high when comparing reality with bankruptcy predictions. From a total of 45 samples, 39 predictions match the reality experienced by the company. Next, the accuracy of the bankruptcy analysis calculation using the Grover Method:

Table 6.
Accuracy and Error Rate of Grover Model

Recap	Condition	Predictions		Total
		Distress	Non Distress	
Reality	Distress	1	19	20
	Non Distress	1	24	25
	Total	2	43	45
AccuracyLevel		55,56%		
Type I		42,22%		
Type II		2,22%		

Source: Data processed, Researcher, 2023

Based on the data in the table above, the accuracy level of bankruptcy analysis calculations with the Grover Method is 55.56%, meaning that the accuracy level is high when comparing reality with bankruptcy predictions. From a total of 45 samples, 25 predictions match the reality experienced by the company.

Discussion

Based on bankruptcy analysis using the Altman Z-score Method of the 45 predicted data, the Altman Z-Score model indicates that companies with the KAEF issuer code experienced financial difficulties for four consecutive years, from 2019 to 2022. In addition, companies with the issuer code MERK are also predicted to experience financial difficulties in 2020 and 2022. Issuers with the code PEHA are predicted to experience financial difficulties for five periods from 2018 to 2022. There is a prediction conformity with the fact that the company with the issuer code PYFA experienced financial difficulties in 2020 and 2022, according to the Altman Z-Score model. Finally, companies with the issuer code INAF are predicted to experience financial difficulties for four periods, namely in 2019 and 2021 to 2022.

It should be noted by companies with the issuer code KAEF that the value of the Working Capital to Total Asset ratio tends to be low and even negative in 2019 (-0.26%) and 2020 (-3.95%). A low WCTA ratio indicates low liquidity, while a healthy company should have high liquidity to support operational working capital and increase profits through increased sales.

A similar situation occurred with PEHA, where the WCTA ratio was below 5% for four periods, with negative values in 2020 (-3.13%) and 2021 (-2.01%). This ratio reflects the possibility of companies seeking additional sources of funds that can increase debt if it is at a minimal or even negative level. A negative net working capital is likely to face difficulties in covering short-term liabilities due to the lack of sufficient current assets.

It is also important to note that the assessment of a company's profitability can be seen from its profit before tax. The data shows fluctuations in PEHA's pre-tax profit, especially in 2020 which recorded negative EBIT, can trigger a negative EBITTA ratio. This can be interpreted as an indication that operating costs in that year were higher, causing the company's performance to be unproductive, and this could be a sign of financial distress.

The company with the issuer code INAF is expected to experience problems related to unfavorable operational activities. It can be seen from the Earning Before Interest obtained for three periods getting negative numbers, namely in 2018, 2020, and 2022. This is not in line with the interest expense that is increasing every period. From EBIT, it can be seen that the company is compliant in managing and paying interest costs or taxes. This imbalance that occurs will make it difficult for the company to fulfil its interest or tax obligations. In addition, EBIT is

also useful for building the company's image in the eyes of investors and creditors. From EBIT, you can see the company's compliance in managing and paying interest or tax costs.

The Grover G-Score model predicts companies in financial distress, and in fact, only one company was identified with the issuer code INAF in 2022. This issuer code consistently recorded negative values in the three Grover model ratios used, namely ROA, WCTA, and EBITTA. When looking at the financial statements, the negative ROA value is concluded to be caused by the company's continuously adverse or loss-making profit condition. This shows that the overall ability of invested capital has not been able to generate profits. The company is considered less than optimal because it gets a lower rate of return on invested assets. Therefore, the company needs to design a more effective strategy so that the invested capital can be converted into profitable profits that can help the company to continue operating and survive.

CONCLUSION

Based on the analysis and test results of the financial distress model in pharmaceutical companies, it can be concluded as follows:

1. The Altman Z-Score model was able to accurately predict the financial distress of a total of 45 samples tested. The model correctly predicted 39 samples, of which 17 experienced financial distress, and 22 did not experience financial distress. However, there were six samples with prediction discrepancies. The accuracy of the Altman Z-Score model in predicting financial distress in pharmaceutical companies reached 86.67%, with a Type I and Type II error rate of 6.67%.
2. On the other hand, the Grover G-Score Model was also able to accurately predict the financial distress of the total 45 samples tested. The model correctly predicted 25 samples, of which only one experienced financial distress and 24 did not experience financial distress. However, there were 20 samples with prediction discrepancies. The accuracy of the Grover G-Score model in predicting financial distress in pharmaceutical companies reached 55.56%, with a Type I error rate of 42.22% and Type II of 2.22%.
3. From this comparison, the Altman Model shows a higher accuracy rate, reaching 86.67%, compared to the Grover G-Score Model, which has an accuracy rate of 55.56%.

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