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ANALYSIS OF BANKRUPTCY PREDICTION IN HEALTH SECTOR COMPANIES LISTED ON THE INDONESIAN STOCK EXCHANGE IN THE PERIOD 2021-2023

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ABSTRACT

This study aims to analyze the bankruptcy of healthcare companies listed on the Indonesia Stock Exchange for the 2021-2023 period using the Altman Z-Score, Springate, Zmijewski, Grover, and Fulmer models and to determine whether there are differences in conditions from the results of the financial distress model analysis using the Altman Z-Score, Springate, Zmijewski, Grover, and Fulmer models and to determine the model that has the highest level of accuracy in predicting the potential for bankruptcy in companies. This research is a study with a mix method approach. The data source in this study is secondary data in the form of financial reports. The population in this study were healthcare companies listed on the Indonesia Stock Exchange for the 2021-2023 period. Sampling was carried out using a purposive sampling technique so that a sample of 23 companies and 96 analysis units were obtained. The results of this study indicate that Indofarma is the only company predicted to go bankrupt in the results of each financial distress model. The results of this study also show that there are differences in conditions from the results of the financial distress model analysis in healthcare companies. The model that has the highest level of accuracy in healthcare companies is the Grover model at 95.66%. The results of the best predictions and models can provide information in the form of positive signals and early warning systems for investors.

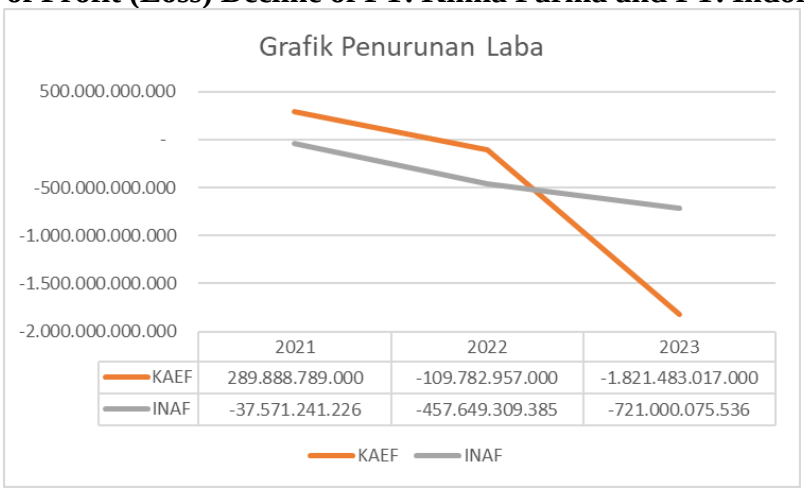
INTRODUCTION

The health sector is a defensive sector because it provides essential needs to the community, thus the health sector also plays a role in the economic recovery in Indonesia. According to data from the Indonesian Ministry of Health, in 2021 there were approximately 241 registered pharmaceutical companies in Indonesia, and this number increased compared to 2020. Similarly, the number of hospitals in Indonesia also increased. According to data from the Indonesian Ministry of Health, from 2019 to 2023, the number of hospitals in Indonesia increased by 9.7% (Kemenkes RI, 2024). This increase is estimated to be supported by the rising demand for medicines, multivitamins, supplements, and medical services to continuously improve public health, leading to significant growth in the health industry.

However, there are other challenges faced by this sector, particularly pharmaceutical companies. These challenges stem from the high cost of raw materials, a significant portion of which is still met through imports. Consequently, the depreciation of the Rupiah's exchange rate will have a greater impact, putting pressure on company profits and lowering stock values, which will ultimately affect company performance. Quoting from CNBC (2023) the health sector reportedly weakened by up to 3% in early trading on Tuesday, August 1, 2023, and some companies even experienced a stock decline of up to 10%, such as PT. Prodia Widyahusada Tbk.

While eleven healthcare companies are said to be weakening, two pharmaceutical companies are actually predicted to be at risk of bankruptcy. Quoting CNBC Indonesia (2024), two pharmaceutical companies, Kimia Farma and Indofarma, recorded worsening financial performance reports.

Figure 1. Graph of Profit (Loss) Decline of PT. Kimia Farma and PT. Indofarma 2021-2023



Source: Collection of Research (2025)

At the end of 2023, Indofarma recorded a loss of Rp721 billion, with this loss reaching 57.5% compared to 2022. Quoted Tempo.co (2024), Indofarma revealed that they could not predict when Covid-19 would end, so they purchased a large quantity of drug ingredients, resulting in an unsold inventory of Rp23.64 billion. PT. Kimia Farma recorded its largest loss in 2023. Quoted from Kontan.co.id (2024), the decline in Kimia Farma's profit throughout 2023 occurred due to the cost of goods sold swelling by 25.83% to Rp6.86 trillion from the previous Rp5.45 trillion.

The losses that have occurred at Indofarma and Kimia Farma can serve as an indicator that these companies are struggling to meet their business obligations. If this situation is allowed to continue, these companies could indeed face bankruptcy. Therefore, it is important to conduct bankruptcy prediction analysis. Many methods can be used to predict corporate bankruptcy, including Altman, Springate, Zmijewski, and Grover. These models have demonstrated the highest accuracy in several previous studies.

Christa dan Mukti (2023) dan Saputra & Arisyah (2024) reported that the Altman model is the most accurate model. Harsanti et al. (2024); Nurhayati et al. (2022); Rj Nur et al. (2022); Wahidah et al. (2024) reported that the Springate model is the most accurate model. Andriani & Trisnaningsih (2023); Pakdaman, 2018; Pratiwi, 2020; Sudrajat & Wijayanti (2019) reported that the Grover model is the most accurate model. Siswanto & Romadon (2021) reported that the Zmijewski model is the most accurate model. Another model that will be used in this research is the Fulmer model, which is rarely used but was reported as the most accurate model in Putri & Werastuti (2020) research

This research will provide a bankruptcy prediction analysis regarding the condition of healthcare companies during 2021-2023, determine if any of the bankruptcy prediction models used are consistent, and identify the most accurate model for predicting healthcare company bankruptcy.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A. Signalling Theory

This theory was proposed by Spence (1973), which discusses the labor market and how signal senders possess information and transmit it to signal receivers due to its reliability. According to Brigham et al. (2009), signaling theory refers to the actions of company management that demonstrate to investors how management views the company's prospects. Therefore, this bankruptcy prediction analysis research will generate highly useful information, which will subsequently serve as a signal to external parties, including creditors, investors, and other financial statement users, indicating whether the company's condition is favorable. This signal can help prevent investors from making poor capital investment decisions and creditors from making poor loan decisions to the company.

B. Financial Statements

According to Kasmir (2019:7), financial statements are reports that indicate the financial condition of a company at a specific point in time or over a certain period. Financial statements are intended to provide information about cash flow, financial performance, and the financial situation of an entity, enabling users to make sound financial decisions. The financial situation and operational results of a company at a given time will be detailed in its financial statements.

C. Financial Statement Analysis

Financial statement analysis involves breaking down financial statement items into smaller, more digestible information and examining their significant relationships, both quantitatively and non-quantitatively, to gain a deeper understanding of the financial situation as a crucial step in making the best decisions (Harahap, 2015:190)

D. Bankruptcy

According to Prihadi (2019:464) bankruptcy is a condition where a company is no longer able to meet its obligations. Bankruptcy refers to a situation where a company is unable to meet its debt obligations or experiences failure in running its business operations after initially being able to operate (Haryani & Syafei, 2023). According to Darsono & Ashari (2005:101) , financial distress begins when a business is unable to pay its debts on time, leading to bankruptcy.

E. Altman Z-Score Model

According to Altman, as cited by Hanafi & Halim (2016:272), there are five financial ratios included in the model to distinguish between companies at risk of bankruptcy and those that are not. The Altman Z-Score is calculated using the following formula

$Z = 1{,}2X1 + 1{,}4X2 + 3{,}3X3 + 0{,}6X4 + 1{,}0X5$

Description :

Z = Bankruptcy Index
X1 = Working Capital to Total Assets (WCTA)
X2 = Retained Earning to Total Assets (RETA)
X3 = Earning Before Interest and Taxes to Total Assets (EBITTA)
X4 = Market Value of Equity to Book Value of Debt (MVE/BVT)
X5 = Sales to Total Assets (SATA)

The cut-off points used in the Altman Z-Score model are:

a. If $Z < 1.81$ = the company is categorized as bankrupt.
b. If $1.81 < Z < 2.99$ = the company is categorized in the grey area or vulnerable zone, where it cannot yet be predicted whether the company will experience bankruptcy or not.
c. If $Z > 2.99$ = the company is categorized as not bankrupt.

F. Springate Model

In this model, Springate uses 4 ratios from 19 financial ratios that are believed to distinguish between distressed and non-distressed companies. The equation for the Springate model (1978) is as follows:

S-Score = 1,03A + 3,07B + 0,66C + 0,4D

Description:

S = Bankruptcy Index

A = Working capital to Total Assets (WCTA)

B = Earning Before Interest and Taxes to Total Assets (EBITTA)

C = Earning Before Taxes to Current Liabilities (EBTCL)

D = Sales to Total Assets (SATA)

The cut-off points used in the Springate model (S-Score) are:

a. If S < 0.862 = indicates that the company's condition is unhealthy and has the potential to experience bankruptcy.
b. If S > 0.862 = the company is categorized as not bankrupt, which means the company is in a healthy condition.

G. Zmijewski Model

This model produces the following formula:

X = -4,3 – 4,5X1 + 5,7X2 – 0,004X3

Description :

X = Bankruptcy Index

X1 = Return on Assets (ROA)

X2 = Debt ratio (leverage)

X3 = Current ratio (liquidity)

The cut-off points used in the Zmijewski model (X-Score) are to classify companies that have a value:

a. If the X-Score is positive (X-Score ≥ 0), then the company can be classified as in an unhealthy or bankrupt condition.
b. If the X-Score is negative (X-Score < 0), then the company is classified as in a healthy condition.

H. Grover Model

The Grover model is an improvement on the Altman model. The Grover model uses X1 and X3, which are used in the Altman model, and adds the ROA indicator. The Grover model equation is as follows:

G-Score = 1,650X1 + 3,404X2 - 0,016X3 + 0,057

Description :

X1 = Working Capital/Total Asset

X2 = Earnings Before Interest and Taxes/Total Asset

X3 = Net Income/Total Asset (ROA)

The cut-off points used in the Grover model are:

a. If a company has a G-Score above 0.01, the company is predicted to be in a non-distress (healthy) state.
b. If a company has a G-Score below -0.02, the company is predicted to be in a distressed state and potentially bankrupt

I. Fulmer Model

This model uses 9 financial ratio variables that have a relationship with financial distress. The equation for the Fulmer et al. (1984) model is as follows :

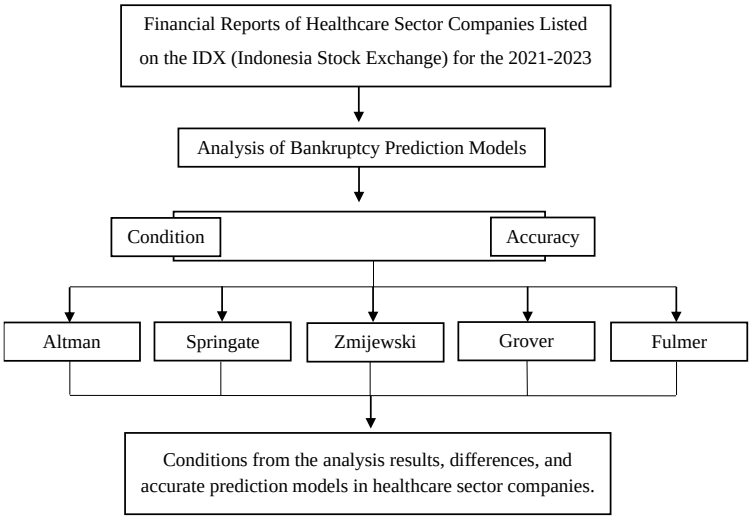
H-Score = 5,528X1 + 0,212X2 + 0,073X3 + 1,270X4 - 0,120X5 + 2,335X6 + 0,575X7 + 1,083X8 + 0,894X9 - 6,075

Description :
H = Bancrupty Index
X1 = Retained Earnings to Total Assets
X2 = Sales to Total Assets
X3 = Earnings Before Taxes to Total Equity
X4 = Cash Flow from Operations to Total Liabilities
X5 = Total Liabilities to Total Assets
X6 = Current Liabilities to Total Assets
X7 = Log (Fixed Assets)
X8 = Working Capital to Total Liabilities
X9 = Log EBIT to Interest Expense
The cut-off points used in the Fulmer model are:

a. If a company has an H-Score above 0, the company is predicted to be in a non-distress (healthy) state.
b. If a company has an H-Score below 0, the company is predicted to be in a distressed state and potentially bankrupt.

J. Conceptual Framework

Figure 2. Conceptual Framework



Source : Collection of Research (2025)

K. Research Hypothesis:

Hypothesis: Comparison of the Conditions of All Bankruptcy Prediction Models
In the research by Sudrajat & Wijayanti (2019) using the Altman, Zmijewski, and Grover models, the test results showed that there are differences in predictions between the Altman, Zmijewski, and Grover models in predicting bankruptcy (financial distress). Similar results were also found in the research by Pratiwi (2020) and Rj Nur et al. (2022), as well as other previous studies. Based on these results, the researchers predict that there are differences in the conditions of each model. Therefore, the first hypothesis of this study is:
Ha: There are differences in bankruptcy predictions between the Z Score (Altman), Springate, Zmijewski, Grover, and Fulmer models in healthcare sector companies listed on the IDX.

METHODS

A. Research Type

The type of research used in this study is comparative research with a quantitative and qualitative approach (mix method), also known as a combination. Comparative research is defined by Sugiyono

(2017:36) as a study that compares the existence of one or more variables in two or more different samples, where this research will examine whether there are differences or not between several models used in predicting bankruptcy. The mixed method, according to Sugiyono (2013:499), is a research approach that combines or connects qualitative and quantitative research methods. The quantitative method in this study involves calculating the financial distress conditions of companies using various models and testing whether or not there are differences between these models. Then, the qualitative method is used as a complement and also serves to answer research questions that cannot be answered with hypothetical assumptions, where a descriptive analysis of the company's conditions from each bankruptcy prediction model is required.

B. Data Types and Sources

The type of data used in this research is secondary data. The data source for this research is the financial reports of healthcare sector companies listed on the Indonesia Stock Exchange (IDX) for the 2021–2023 period. Data information can be obtained from the official website of the Indonesia Stock Exchange, www.idx.co.id, as well as the websites of healthcare companies and other related websites.

C. Population and Sample

The population in this research is all healthcare sector companies listed on the Indonesia Stock Exchange (IDX) for the 2021-2023 period, totaling 33 companies. The sample in this research is healthcare sector companies that are listed and published complete financial reports consecutively on the Indonesia Stock Exchange (IDX) for the 2021-2023 period. Using purposive sampling technique, the sample in this research consists of 23 companies.

D. Data Analysis Techniques

Company Category Classification

This classification is based on the following two categories (Platt & Platt, 2008).

a. Companies predicted to have the potential for bankruptcy are categorized as distressed companies, with the criteria of having negative net income or losses for 2 consecutive years.
b. Companies predicted not to have the potential for bankruptcy are categorized as non-distressed companies, with the criteria of having positive net income.

Calculation of Financial Distress Models

This calculation is done using the Altman Z-Score, Springate, Zmijewski, Grover, and Fulmer models.

Normality Test

In this research, the One Sample Kolmogorov-Smirnov test will be used with a significance level of 0.05. The selection of this test is due to the analysis test in this study having more than 50 data points, and if the number of data whose normality is tested is >50, then for good interpretation of the results, the parameters from Kolmogorov-Smirnov can be used (Setyawan, 2022:139). Data is considered normally distributed if the significance is greater than 0.05. This normality test is conducted to determine the regression tool to be used.

Hypothesis Test (Difference Test)

The difference test tools are One Way ANOVA and Kruskal-Wallis. The One Way ANOVA test will be used if the analyzed data is normally distributed. If the analyzed data is not normally distributed, then the test tool that must be used is the Kruskal-Wallis Test (Rosalina et al., 2023:17). The decision-making provisions are as follows:

1. If the Asymp.Sig value > 0.05, then there is no significant difference.
2. If the Asymp.Sig value < 0.05, then there is a significant difference.

Accuracy Level and Type of Error Assessment

According to Ghozali (2018:289), the accuracy level and type of error can be calculated in the following ways:

$$\text{Accuracy Level} = \frac{\text{Number of correct predictions}}{\text{Number of samples}} \times 100\%$$

$$\text{Type of Error I} = \frac{\text{Number of type I errors}}{\text{Number of samples}} \times 100\%$$

$$\text{Type of Error II} = \frac{\text{Number of type II errors}}{\text{Number of samples}} \times 100\%$$

RESULTS

A. Result

1. Company Category

Descriptive statistics provide a basic understanding of the structure and characteristics of a data set. The following are the results of descriptive statistics:

Table 1. Company Name and Real Condition

No	Kode	Nama Perusahaan	Kondisi Real
1	KLBF	Kalbe Farma Tbk.	Non Distress
2	MERK	Merck Tbk.	Non Distress
3	KAEF	Kimia Farma Tbk.	Distress
4	INAF	Indofarma Tbk.	Distress
5	DVLA	Darya-Varia Laboratoria Tbk.	Non Distress
6	PEHA	Phapros Tbk.	Non Distress
7	PYFA	Pyridam Farma Tbk.	Non Distress
8	SCPI	Organon Pharma Indonesia Tbk.	Non Distress
9	SIDO	Industri Jamu dan Farmasi Sido Muncul Tbk.	Non Distress
10	SOHO	Soho Global Health Tbk.	Non Distress
11	TSPC	Tempo Scan Pacific Tbk.	Non Distress
12	DGNS	Diagnos Laboratorium Utama Tbk	Non Distress
13	PRIM	Royal Prima Tbk	Non Distress
14	IRRA	Itama Ranoraya Tbk	Non Distress
15	BMHS	Bundamedik Tbk	Non Distress
16	PRDA	Prodia Widyahusaha Tbk	Non Distress
17	CARE	Metro Healthcare Indonesia Tbk	Distress
18	SRAJ	Sejahtera Anugrahjaya Tbk	Distress
19	MIKA	Mitra Keluarga Karyasehat Tbk	Non Distress
20	RSGK	Kedoya Adyaraya Tbk	Non Distress
21	HEAL	Medikaloka Hermina Tbk	Non Distress
22	SILO	Siloam Internasional Hospitals Tbk	Non Distress
23	SAME	Sarana Meditama Metropolitan Tbk	Non Distress

Source : Processed Data, 2025

2. Altman Z-Score Model Bankruptcy Prediction Analysis

Table 2. Results of Altman Z-Score Calculation for Healthcare Companies

No	Kode	Z-Score	Keterangan
1	KLBF	14,256	Non Distress
2	MERK	243,195	Non Distress
3	KAEF	0,970	Distress
4	INAF	-0,189	Distress
5	DVLA	4,864	Non Distress

6	PEHA	1,303	Grey Area
7	PYFA	1,685	Grey Area
8	SCPI	3,964	Non Distress
9	SIDO	25,713	Non Distress
10	SOHO	4,868	Non Distress
11	TSPC	4,126	Non Distress
12	DGNS	10,041	Non Distress
13	PRIM	5,991	Non Distress
14	IRRA	6,201	Non Distress
15	BMHS	3,586	Non Distress
16	PRDA	12,148	Non Distress
17	CARE	8,059	Non Distress
18	SRAJ	1,154	Grey Area
19	MIKA	31,939	Non Distress
20	RSGK	9,861	Non Distress
21	HEAL	5,409	Non Distress
22	SILO	5,882	Non Distress
23	SAME	4,463	Non Distress

Source : Processed Data, 2025

Based on the results of bankruptcy prediction calculations using the Altman Z-Score model, it is known that the healthcare companies in distress (bankrupt) condition are 2 companies with a value < 1.1. These companies are Indofarma Tbk. and Kimia Farma Tbk. Additionally, there are 3 companies in the grey category, where these companies are in a state between bankrupt and safe. And there are 18 companies in a healthy condition.

3. Springate Model Bankruptcy Prediction Analysis

Table 3. Results of Springate Calculation for Healthcare Companies

No	Kode	S-Score	Keterangan
1	KLBF	2,152	Non Distress
2	MERK	2,340	Non Distress
3	KAEF	0,129	Distress
4	INAF	-1,387	Distress
5	DVLA	1,400	Non Distress
6	PEHA	0,532	Distress
7	PYFA	0,818	Distress
8	SCPI	2,120	Non Distress
9	SIDO	3,675	Non Distress
10	SOHO	1,679	Non Distress
11	TSPC	1,521	Non Distress
12	DGNS	1,993	Non Distress
13	PRIM	0,698	Distress
14	IRRA	1,182	Non Distress
15	BMHS	0,784	Distress
16	PRDA	2,814	Non Distress
17	CARE	0,042	Distress
18	SRAJ	-0,017	Distress
19	MIKA	2,635	Non Distress
20	RSGK	0,997	Non Distress

21	HEAL	1,152	Non Distress
22	SILO	1,211	Non Distress
23	SAME	0,320	Distress

Source : Processed Data, 2025

Based on the results of bankruptcy prediction calculations using the Springate model, it was found that 9 healthcare companies are in distress (bankrupt) with values < 0.862, with the highest values obtained by Indofarma Tbk. and Kimia Farma Tbk. Meanwhile, 14 companies are categorized as healthy.

4. Zmijewski Model Bankruptcy Prediction Analysis

Table 4. Results of Zmijewski Calculation for Healthcare Companies

No	Kode	Z-Score	Keterangan
1	KLBF	-3,889	Non Distress
2	MERK	-3,579	Non Distress
3	KAEF	-0,801	Non Distress
4	INAF	4,691	Distress
5	DVLA	-2,828	Non Distress
6	PEHA	-1,049	Non Distress
7	PYFA	-0,197	Non Distress
8	SCPI	-3,172	Non Distress
9	SIDO	-4,760	Non Distress
10	SOHO	-2,085	Non Distress
11	TSPC	-3,026	Non Distress
12	DGNS	-3,653	Non Distress
13	PRIM	-3,975	Non Distress
14	IRRA	-2,224	Non Distress
15	BMHS	-2,326	Non Distress
16	PRDA	-4,195	Non Distress
17	CARE	-2,907	Non Distress
18	SRAJ	-0,639	Non Distress
19	MIKA	-4,389	Non Distress
20	RSGK	-3,932	Non Distress
21	HEAL	-2,426	Non Distress
22	SILO	-3,110	Non Distress
23	SAME	-3,244	Non Distress

Source : Processed Data, 2025

Based on the results of bankruptcy prediction calculations using the Zmijewski model, it was found that only Indofarma Tbk is in distress (bankrupt) with a value > 0. Meanwhile, 22 companies are categorized as healthy.

5. Grover Model Bankruptcy Prediction Analysis

Table 5. Results of Grover Calculation for Healthcare Companies

No	Kode	G-Score	Keterangan
1	KLBF	1,336	Non Distrees
2	MERK	1,660	Non Distrees
3	KAEF	-0,040	Distrees
4	INAF	-1,853	Distrees
5	DVLA	1,149	Non Distrees
6	PEHA	0,422	Non Distrees
7	PYFA	0,628	Non Distrees

8	SCPI	1,375	Non Distrees
9	SIDO	1,906	Non Distrees
10	SOHO	1,164	Non Distrees
11	TSPC	1,069	Non Distrees
12	DGNS	1,156	Non Distrees
13	PRIM	0,458	Non Distrees
14	IRRA	0,897	Non Distrees
15	BMHS	0,506	Non Distrees
16	PRDA	1,462	Non Distrees
17	CARE	0,261	Non Distrees
18	SRAJ	-0,267	Distrees
19	MIKA	1,244	Non Distrees
20	RSGK	0,542	Non Distrees
21	HEAL	0,607	Non Distrees
22	SILO	0,614	Non Distrees
23	SAME	0,187	Non Distrees

Source : Processed Data, 2025

Based on the results of bankruptcy prediction calculations using the Grover model, it was found that 3 healthcare companies are in distress (bankrupt) with values < -0.02. These companies are Indofarma Tbk., Kimia Farma Tbk., and Sejahtera Anugrahjaya Tbk. Meanwhile, 20 companies are categorized as healthy.

6. Fulmer Model Bankruptcy Prediction Analysis

Table 6. Results of Fulmer Calculation for Healthcare Companies

No	Kode	H-Score	Keterangan
1	KLBF	11,485	Non Distress
2	MERK	10,236	Non Distress
3	KAEF	3,415	Non Distress
4	INAF	-0,533	Distress
5	DVLA	9,050	Non Distress
6	PEHA	3,458	Non Distress
7	PYFA	3,844	Non Distress
8	SCPI	10,112	Non Distress
9	SIDO	11,478	Non Distress
10	SOHO	5,994	Non Distress
11	TSPC	8,523	Non Distress
12	DGNS	8,361	Non Distress
13	PRIM	21,203	Non Distress
14	IRRA	4,472	Non Distress
15	BMHS	3,959	Non Distress
16	PRDA	10,564	Non Distress
17	CARE	3,263	Non Distress
18	SRAJ	3,701	Non Distress
19	MIKA	12,128	Non Distress
20	RSGK	6,176	Non Distress
21	HEAL	5,371	Non Distress
22	SILO	5,395	Non Distress
23	SAME	3,280	Non Distress

Source : Processed Data, 2025

Based on the results of bankruptcy prediction calculations using the Fulmer model, it was found that only Indofarma Tbk is in distress (bankrupt) with a value < 0. Meanwhile, 22 companies are categorized as healthy.

7. The normality test

The normality test aims to test whether in the regression model, confounding or residual variables have a normal distribution.As is known, the t and F tests assume that the residual values follow a normal distribution. If this assumption is violated, the statistical test becomes more invalid for small sample sizes (Ghazali, 2021).

Table 7. Results of normality test

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Altman	.379	69	.000
Springate	.078	69	.200
Zmijewski	.180	69	.000
Grover	.160	69	.000
Fulmer	.162	69	.000

Source : Processed Data, 2025

Based on the table above, the output of the test using the Kolmogorov-Smirnov test with 69 samples degrees of freedom (df) in healthcare companies shows that only the Springate model has a p-value > 5%, which is 0.200. This indicates that the Springate model has normally distributed data. Meanwhile, the other 4 models have a p-value < 5%, namely the Altman Z-Score, Zmijewski, Grover, and Fulmer models, each with a value of 0.000. These results indicate that these 4 models have non-normally distributed data. Therefore, further testing is conducted using a non-parametric difference test (Kruskal-Wallis test) via SPSS software.

8. Hypothesis Testing (Difference Test)

Table 8. Results of the Kruskal-Wallis Difference Test

	Skor
Chi-Square	225.374
Df	4
Asymp. Sig.	.000

Source : Processed Data, 2025

The statistical test results show that the Asymp. Sig. value from the Kruskal-Wallis test is 0.000. Because the Asymp. Sig. value is < 0.005, the hypothesis is accepted. Therefore, it can be concluded that there are differences in conditions from the results of the analysis of the six bankruptcy prediction models used to predict the potential bankruptcy of healthcare companies listed on the Indonesia Stock Exchange for the 2021-2023 period.

9. Accuracy Test and Types of Error

Table 9. Recapitulation of Bankruptcy Prediction Model Accuracy

Perhitungan	**Altman**	**Springate**	**Zmijewski**	**Grover**	**Fulmer**
Prediksi Benar	20	18	20	22	20
Grey Area	3	-	-	-	-
Akurasi	**86,96%**	**78,6%**	**86,96%**	**95,66%**	**86,96%**
Type I Error	0%	0%	13,04%	4,34%	13,04%
Type II Error	0%	21,74%	0%	0%	0%
Grey Area	13,04%	-	-	-	-
Total	**100%**	**100%**	**100%**	**100%**	**100%**

Source : Processed Data, 2025

Based on the comparison of the accuracy of the level of test results and the type of error in the table above, it can be that concluded the Grover model is the most accurate prediction model in predicting the bankruptcying the of healthcare companies with an accuracy level of 95.66%, with Type Error I of 4.34% and Type Error II of 0%. Followed by the Altman Z-Score model with an accuracy of 86.96%, with Type Error I of 0%, Type Error II of 0%, and a grey area of 13.04%. Furthermore, the Zmijewski and Fulmer models with an accuracy of 86.96%, Type Error I of 4.34%, and Type Error II of 0%. And finally, the model with the lowest accuracy level is the Springate model with 78.26%, Type Error I of 0%, and Type Error II of 21.74%.

RESULT

1. Company Condition from Bankruptcy Prediction Analysis

Based on the research results, Indofarma Tbk. is predicted to go bankrupt in the future according to all prediction bankruptcy models. Kimia Farma is predicted to go bankrupt using the Altman Z-Score, Springate, and Grover models. , the Vover model also predicts Prosperous Anugrahjaya Tbk. will go bankrupt in the future. The Springate model also predicts several other companies to be in bankruptcy, that is Sejahtera Anugrahjaya Tbk., Phapros Tbk., Pyridam Farma Tbk., Royal Prima Tbk, Bundamedik Tbk, Metro Healthcare Indonesia Tbk, and Sarana Meditama Metropolitan Tbk.

Looking at each of the bankruptcy analysis methods used, there are several factors that cause these transportation companies to be predicted to go bankrupt. These factors are:

1) Liabilities Greater Than Assets

In 2022, Indofarma's current liabilities were Rp985,245,941,033, and Indofarma's current insurrection in 2022 to Rp863,577,052,312, resulting in a difference between current assets and current liabilities of 12.35%. In 2023, this difference increased reaching significantly, 83.84%, where Indofarma's total current assets were Rp198,991,900,314, while its total current liabilities reached Rp1,231,087,955,072. The large amount of current liabilities resulted in Indofarma's working capital being negative for two years. Negative working capital can lead to negative cash flow. Therefore, Indofarma must take steps to increase its current assets and reduce its current liabilities.

2) Inability to Generate Profit

Indofarma Tbk. has been unable to generate profit for two years out of the past three years, namely 2022-2023. In fact, Indofarma Tbk. has already recorded losses from profit before tax and interest. This also impacts Indofarma's net profit, which has also turned negative. Indofarma Tbk.'s losses in 2023 even reached 57.5% compared to 2022, where Indofarma's losses in 2022 were Rp479,544,148,232 and in 2023 these losses increased to Rp603,460,670,279. These losses occurred due to the large expenses from many expired and unsold drugs. The inability to generate profit is a worrying condition for both companies, so steps must be taken in the future to maximize profit.

In addition to the factors that can be analyzed from financial reports, another factor that causes Indofarma to be in distress is the alleged financial management fraud, where PT Indofarma Global Medika did not deposit the proceeds from the distribution of Indofarma products. This case impacted Indofarma's shares. The Indonesia Stock Exchange (IDX) even officially suspended the shares of state-owned PT Indofarma Tbk. on February 14, 2024. This is because INAF was unable to pay the annual listing fee and even unable to pay employee salaries.

Based on the factors mentioned above, here are the steps that the author can suggest to prevent bankruptcy:

1) Conduct an evaluation of the company's management performance to maximize profits.
2) Conduct efficiency on operational costs, so as to reduce debt. This is due to the high operational costs that must be incurred by healthcare companies because after Covid, many drugs could not be resold, resulting in high operational costs to pay high expenses. These high costs caused the company to take on debt for its working capital because the company's profits were insufficient. Therefore, steps are needed to streamline costs, so that debt can be reduced and profits can be increased.

2. Analysis of Differences in Bankruptcy Prediction Models

The results of the first hypothesis test using the Kruskal-Wallis test obtained a significance level of 0.000, which is smaller than the probability of 0.05 (Asymp.Sig < 0.05). Thus, it can be concluded that the hypothesis is accepted, meaning that there are significant differences between the Altman Z-Score, Springate, Zmijewski, Grover, and Fulmer calculation models in predicting the bankruptcy of healthcare companies listed on the Indonesia Stock Exchange for the 2021-2023 period.

These differences in bankruptcy prediction are due to the use of different ratios, the different number of ratios used from each prediction model, different coefficient values, and different cut-off values from each prediction model. This result is in line with the research of Sudrajat & Wijayanti (2019), which

used the Altman, Zmijewski, and Grover models. The research showed test results that there were differences in predictions between the Altman, Zmijewski, and Grover models in predicting bankruptcy (financial distress). Research by Harsanti et al. (2024) also yielded similar results, where there were differences in predictions between the Altman, Zmijewski, and Grover models in predicting bankruptcy (financial distress).

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3. Analysis of the Highest Accuracy Level and Type of Error

The Grover model is the most accurate model in predicting the bankruptcy of healthcare companies because the Grover used model a wider range of financial variables. This includes profitability, liquidity, leverage, and operational efficiency ratios, which provides a more comprehensive picture of the company's financial health. This model where profitability as the main factor in assessing the likelihood of bankruptcy. This is in line with what Platt & Platt (2008), that companies categorized as distressed as distressed are companies that have negative net profits for 2 consecutive years. Furthermore, Hanafi & Halim (2016) stated that the analysis of a company's financial statements is essentially to determine the level of profitability (profit) and the level of risk or the level of company health.

The results of this study are in line with research conducted by Pakdaman (2018), where in his research the Grover model was the best model for assessing bankruptcy prediction with an accuracy level of 98%. Similar research results were also found in research by Andriani et al. (2023); Christa & Mukti (2023); Sudrajat & Wijayanti (2019). The Grover model is the most accurate model compared to other models. However, the accuracy level of the Grover model from each of these studies is different. The highest accuracy level of the Grover model was found in the research of Sudrajat & Wijayanti (2019), which was 85.14%. The highest accuracy level of the Grover model was also found in research by Pratiwi et al. (2023), where the accuracy value of the Grover model reached 100%

CONCLUSION

Indofarma Tbk. is the only company predicted to go bankrupt by every model. Subsequently, 3 other models, namely Altman Z-Score, Springate, and Grover, predict that Kimia Farma Tbk. will experience bankruptcy, 2 models, namely Springate and Grover, predict that Sejahtera Anugrahjaya Tbk. will experience bankruptcy, and only the Springate model predicts that Phapros Tbk., Pyridam Farma Tbk., Royal Prima Tbk., Bundamedik Tbk., Metro Healthcare Indonesia Tbk., and Sarana Meditama Metropolitan Tbk. will experience bankruptcy. The reason for Indofarma's predicted bankruptcy is the large amount of Indofarma's current liabilities for two consecutive years compared to its current assets. Additionally, Indofarma recorded gross losses for two consecutive years and net losses for three consecutive years. Therefore, an evaluation of the company's management performance is needed to maximize profits and implement efficiency in operational costs.

The calculation results of each model show that there are differences in conditions from the financial distress analysis using the Altman Z-Score, Springate, Zmijewski, Grover, and Fulmer models. The Grover model is the most accurate prediction model in predicting the bankruptcy of healthcare companies with an accuracy level of 95.66%, with Type Error I of 4.34% and Type Error II of 0%. Followed by the Altman Z-Score model with an accuracy of 86.96%, with Type Error I of 0%, Type Error II of 0%, and a grey area of 13.04%. Furthermore, the Zmijewski and Fulmer models with an accuracy of 86.96%, Type Error I of 4.34%, and Type Error II of 0%. And finally, the model with the lowest accuracy level is the Springate model with 78.26%, Type Error I of 0%, and Type Error II of 21.74%.

Research Limitations:

This research only uses 5 models, namely the Altman Z-Score, Springate, Zmijewski, Grover, and Fulmer models. Furthermore, the research sample is limited to healthcare companies, specifically 23 companies.

Recommendations:

1. **For companies**, they can consider using the financial ratios found in the Grover model as an alternative in predicting the condition of a company. Additionally, this research can serve as an

early warning so that internal parties can improve company performance and make improvements before financial distress leads to bankruptcy.

2. **For investors**, they can consider using the Grover model as an alternative to predict the condition of an entity so that investors do not make mistakes in investing their funds.

For further researchers, they can add or compare other bankruptcy prediction analysis models. Additionally, they can increase the number of samples so that it is not only specific to one sector, so that the prediction model can be applied globally and differences from each company sector can be seen.

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