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**ALMAN Z-SCORE ANALYSIS FOR PREDICTING BANKRUPTCY IN  
PHARMACEUTICAL COMPANIES LISTED ON THE INDONESIA STOCK  
EXCHANGE**

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**ARTICLE INFO**

Accepted:

04 February 2023

Revised:

25 February 2023

Approved:

02 March 2023

**ABSTRACT**

This study aims to determine and analyze the risk of bankruptcy of pharmaceutical companies on the Indonesia Stock Exchange based on the Altman Z-Score method. This research uses a type of quantitative descriptive research using secondary data sources. The data collection technique used is a documentation technique in the form of financial reports comprising ten companies for the 2017-2021 period. The method used to analyze bankruptcy risk is the revised Altman method. Where the ratio used is in the form of company financial ratios based on Altman Z Score, namely working capital to total assets (T1), retained earnings to total assets (T2), earnings before interest and taxes to total assets (T3), market value of equity to book value of liability (T4), and sales to total assets (T5). The Altman method in this study can be calculated using the following formula:  $Z = 0,717 T1 + 0,847 T2 + 3,107 T3 + 0,420 T4 + 0,998 T5$ . The results of this study indicate that three companies are at risk of bankruptcy or are in a distress zone, namely PT Indofarma (Persero) Tbk (INAF), PT Kimia Farma Tbk (KAEF), and PT Pharos Tbk (PEHA). Besides that, there are three companies in the grey area zone, and four companies in a safe condition. For the company to avoid bankruptcy risk, the company can improve the company's financial performance by optimizing the company's assets, increasing sales volume, and reducing production costs.

**Keywords:** Altman Z-Score , Bankruptcy, Financial Statements

**INTRODUCTION**

The bankruptcy of a company can be seen and measured through financial reports. Financial reports show the company's financial condition at this time or in a certain period (Kasmir, 2017). This is done by analyzing financial statements (Harahap 2013). The model often used in conducting this analysis is in the form of financial ratios (Adnan and Arisudhana 2017).

Several calculation models can be used to predict the risk of company bankruptcy, namely the models of (Beaver 1966), Altman (1968), (SARI 2016), (Ohlson 1980), and (Zmijewski 1984). In this study, the authors used the Altman Z-Score calculation model. The reason for choosing this model is that it is relatively easy and has a reasonably high level of accuracy in predicting bankruptcy risk. This model can be used for all public, private, and non-manufacturing companies (Liana 2014). The Altman Z-Score model is the best predictor among other predictors, namely the Zmijewski model and the Springate model (Hadi and Anggraeni, 2008).

The Z-score value was developed by Edward I, a business professor from New York University, USA, namely Altman, in 1968. Altman (1968) used the Multivariate Discriminant Analysis (MDA) method using five types of financial ratios, namely WCTA (Working Capital to Total Assets), RETA (Retained Earning to Total Assets), EBITDA (Earning Before Interest and

Taxes to Total Assets), MVEBVL (Market Value of Equity to Book Value of Liability) and STA (Sales to Total Assets). Discriminant analysis is a beneficial technique for predicting bankruptcy in companies. If the company predicted to go bankrupt does not improve, bankruptcy will occur (A Kadim, K., & Nardi 2018).

Pharmaceutical companies are the fourth largest non-oil and gas manufacturing industry contributing to the Indonesian economy. As a strategic industry, the pharmaceutical industry has been designated one of the ten priority industries in the National Industrial Development Master Plan (RIPIN). Pharmaceutical companies have intense competition due to the increasing supply and demand for drugs among all levels of society, both the lower, middle, and upper classes. Drugs are part of the community's basic needs, which is very much needed because they have a function to cure diseases experienced by the community, so the need for pharmaceutical products will increase along with the increase in population. The trend of the total market share of the pharmaceutical sector in Indonesia has increased from Rp. 65.9 trillion in 2016 to Rp. 88.36 trillion in 2019. Even the demand for medicines has increased due to the co-19 pandemic (Yuliardi and Nuraeni 2017). This is reinforced by the news circulating in both the mass media and print media, one of which is reported from Tribunnew.com reporting that in 2020-2021 the demand for drugs will increase 12 times compared to before (Perindustrian 2021). It is due to the increasing awareness of the Indonesian people about the importance of health and the need for medicines.

In addition, domestic pharmaceutical companies are still very dependent on imported raw materials. 95% of Medicinal Raw Materials (BBO) are still imported, originating from China as much as 70%, from India as much as 20%, and the rest from the United States and the European Union. Imports occur due to domestic BBO not meeting existing standards. The dependence on imported medicinal raw materials is immensely worrying for the Indonesian pharmaceutical industry. Suppose the fluctuations in the rupiah exchange rate against foreign currencies will impact increasing production costs. Besides that, high imports of medicinal raw materials will pressure Indonesia's trade balance. Apart from that, the pandemic factor, as is happening now, has made the community's need for both chemical and traditional medicines and health supplements experience a sharp increase. However, with the pandemic, several countries, such as China, had to carry out lockdowns, resulting in Indonesia experiencing difficulties importing medicinal raw materials.

To survive in the business world, companies must always be responsive to their surroundings, especially with the condition of the Indonesian economy, which seems to be constantly shaken by shocks, forcing companies to always detect changes in the company. Pharmaceutical companies that cannot prepare themselves to face this situation may experience a decrease in performance, resulting in bankruptcy (Wang and Campbell 2010).

A similar study was conducted (Sawijaya 2013) entitled Altman Z-Score Analysis to predict bankruptcy in pharmaceutical companies in Indonesia from 2008 to 2015 (Sagho, M. F., & Merkusiwati 2013). The results of this study indicate that from 2008 to 2015, pharmaceutical companies were in the Z-Score cut-off, so most of the pharmaceutical companies on the Indonesia Stock Exchange are in the category of healthy companies.

The difference between this research and previous research is that Rohana Sawijaya used only four pharmaceutical companies as representatives of pharmaceutical companies listed on the Indonesia Stock Exchange (Sugiyono 2018). In contrast, this study used the entire population of pharmaceutical companies listed on the Indonesia Stock Exchange, seeing that these companies were

still classified as a large number. Relatively small, namely ten companies using the revised Altman formula.

The author chose a pharmaceutical company listed on the Indonesia Stock Exchange because this company has bright prospects for the future. By looking at the potential for a growing population, the need for medicines will also increase.

This study aims to determine and analyze the risk of bankruptcy of pharmaceutical companies on the Indonesia Stock Exchange based on the Altman Z-Score method.

## RESEARCH METHODS

The population of this study is the financial statements of pharmaceutical companies listed on the Indonesia Stock Exchange for the 2017-2021 period. Using a sample of all pharmaceutical companies listed on the Indonesia Stock Exchange, there are ten companies. The sampling technique is a nonprobability sampling technique, namely, saturated sampling. Researchers used the revised Altman Z-Score model to analyze the data to predict potential corporate bankruptcy (Altman 1968).

## RESULTS AND DISCUSSION

The data analysis carried out in this study was the Altman Z-Score method, by first calculating each Multivariate Discriminant Analysis ratio to get the Z-Score value (Aulia, F., & Prijati 2018).

### *Working Capital to Total Asset*

**Table 2**  
**Calculation Results of Working Capital to Total Assets**

No	Company Code	Working Capital to Total Asset				
		2017	2018	2019	2020	2021
1	DVLA	0,45	0,47	0,46	0,43	0,48
2	INAF	0,02	0,03	0,28	0,17	0,18
3	KAEF	0,21	0,17	-0,003	- 0,04	0,01
4	MERK	0,45	0,21	0,45	0,44	0,51
5	PEHA	- 0,03	0,02	0,01	- 0,03	-0,02
6	PYFA	0,35	0,31	0,36	0,55	0,42
7	SCPI	0,18	0,52	0,65	0,23	0,27
8	SIDO	0,45	0,35	0,37	0,39	0,42
9	TSPC	0,41	0,39	0,41	0,44	0,44
10	KLBF	0,47	0,46	0,43	0,44	0,46

**Source:** Processed Data, 2022.

Based on the results of the financial ratio of working capital to total assets above, some companies have negative results. With a negative value, the company's liquidity is very low, so it will likely face problems covering its obligations. Among the companies above, PT Kimia Farma

Tbk (KAEF) has had a negative liquidity value for two consecutive years, namely 2019-2020. PT Phapros Tbk (PEHA) had negative liquidity in 2017 and started to improve in 2018-2019, then decreased again to negative in 2020-2021. The company's current debt causes this to be greater than the company's current assets resulting in low working capital (Muhammadun 2022).

#### *Retained Earning to Total Asset*

Table 3						
Calculation Results of Retained Earnings/Total Assets Calculation						
No	Company Code	Retained Earning to Total Asset				
		2017	2018	2019	2020	2021
1	DVLA	0,46	0,49	0,51	0,49	0,53
2	INAF	0,09	-0,06	-0,06	-0,09	-0,06
3	KAEF	0,05	0,04	-0,00	0,00	0,02
4	MERK	0,68	0,38	0,61	0,62	0,69
5	PEHA	0,003	0,07	0,05	0,03	0,01
6	PYFA	0,33	0,33	0,35	0,39	0,17
7	SCPI	0,21	0,26	0,38	0,47	0,60
8	SIDO	0,17	0,13	0,17	0,19	0,25
9	TSPC	0,56	0,57	0,58	0,59	0,59
10	KLBF	0,76	0,76	0,75	0,74	0,72

Source: Processed Data, 2022.

Some companies have a negative value ratio based on the financial ratios of retained earnings to total assets above. This illustrates that the company's ability to accumulate retained earnings is meager. PT Indofarma (Persero) Tbk (INAF) has a negative retained earnings value against total assets for four consecutive years, namely 2018-2021. Meanwhile, PT Kimia Farma Tbk (KAEF) had an unfavorable ratio of retained earnings to total assets in 2019.

#### *Earning Before Interest and Taxes to Total Asset*

Table 4						
Calculation Results of EBIT/Total Asset						
No	Company Code	EBIT to Total Asset				
		2017	2018	2019	2020	2021
1	DVLA	0,138	0,162	0,165	0,108	0,158
2	INAF	- 0,037	- 0,018	0,007	0,011	0,008
3	KAEF	0,074	0,061	0,002	0,004	0,021
4	MERK	0,049	0,040	0,140	0,114	0,168
5	PEHA	0,004	0,095	0,062	0,033	0,007
6	PYFA	0,060	0,061	0,066	0,130	0,033
7	SCOPE	0,133	0,118	0,128	0,181	0,091
8	SIDO	0,216	0,260	0,304	0,312	0,396
9	TSPC	0,100	0,092	0,095	0,117	0,078
10	KLBF	0,195	0,182	0,168	0,161	0,123

Source: Processed Data, 2022

Based on the ratio before interest and tax to total assets above, the level of management

efficiency in obtaining operating profit/loss from assets owned can be seen. From the calculation results above, several companies have experienced losses, so the ratio is negative, namely PT Indofarma (Persero) Tbk (INAF) in 2018-2019.

**Market Value of Equity to Book Value of Debt**

**Table 5**  
**Calculation Results of Equity Value/Total Debt**

No	Company Code	Market Value of Equity to Book Value of Debt				
		2017	2018	2019	2020	2021
1	DVLA	2,128	2,487	2,493	2,008	2,211
2	INFO	0,525	0,525	0,574	0,335	0,227
3	KAEF	0,730	0,550	0,678	0,680	0,624
4	MERK	2,658	0,696	1,935	1,931	2,712
5	PEHA	0,556	0,732	0,694	0,631	0,636
6	PYFA	2,147	1,746	1,888	2,222	0,412
7	SCOPE	0,358	0,443	0,771	1,086	1,859
8	SIDO	11,039	6,672	6,593	5,132	5,807
9	TSPC	2,160	2,229	2,243	2,338	2,289
10	KLBF	5,104	5,363	4,694	4,262	5,676

**Source:** Processed Data, 2022.

Based on the ratio of the book value of equity to the book value of debt above, it can be seen how much the management level of each company's sources of funds is. From the calculation results above, this ratio has a positive value from 2017-2021. PT is the most significant market value of equity to book debt ratio from 2017-2021. Herbal Medicine & Pharmaceutical Industry Sido Muncul Tbk (SIDO) amounted to 11,039 in 2017, and PT. Indofarma (Persero) Tbk (INAF) got the smallest market value of equity to book value of debt ratio, namely 0.227 in 2021.

**Sales to Total Asset**

**Table 6**  
**Calculation Results of Sales / Total Assets**

No	Company Code	Sales to Total Asset				
		2017	2018	2019	2020	2021
1	DVLA	0,960	1,010	0,991	0,921	0,720
2	INFO	1,066	1,104	0,982	1,001	0,641
3	KAEF	1,005	0,788	0,512	0,570	0,504
4	MERK	0,687	0,484	0,826	0,705	0,850
5	PEHA	0,091	0,547	0,527	0,512	0,402
6	PYFA	1,398	1,339	1,295	1,214	0,648
7	SCOPE	1,613	1,348	1,299	1,810	1,102
8	SIDO	0,815	0,828	0,869	0,866	0,988
9	TSPC	1,287	1,282	1,313	1,205	0,868
10	KLBF	1,215	1,161	1,117	1,024	0,787

Source: Processed Data, 2022

Based on the ratio of sales to total assets above, it can be seen how great the company's sales level is. The calculation above shows that the average company has experienced a pretty good increase, but it has not increased yearly. In specific years it has decreased, but not to a negative value.

#### Altman Z-Score Model Analysis Calculation Results

**Table 7**  
**Z-Score Calculation for 2017-2021**

No	Company Code	$Z = 0,717T^1 + 0,847T^2 + 3,107T^3 + 0,420T^4 + 0,998T^5$				
		2017	2018	2019	2020	2021
1	DVLA	2,99	3,31	3,31	2,82	2,93
2	INAF	1,26	1,24	1,40	1,22	0,84
3	KAEF	1,74	1,37	0,80	0,84	0,85
4	MERK	2,86	1,37	2,92	2,71	3,46
5	PEHA	0,32	1,22	1,06	0,88	0,68
6	PYFA	3,01	2,76	2,85	3,27	1,37
7	SCPI	2,49	2,49	2,81	3,39	2,86
8	SIDO	6,58	4,80	4,99	4,43	5,16
9	TSPC	3,27	3,27	3,33	3,36	2,88
10	KLBF	4,94	4,96	4,55	4,25	4,49

Source: Processed Data, 2022

The table above shows the results of calculating the Z-Score of pharmaceutical companies for 2017-2021. The results of these calculations are obtained after calculating each multivariate discriminant analysis ratio with the coefficient value of each variable. The lowest Z-Score value from 2017 to 2021 is 0.32. Namely, PT Pharos Tbk (PEHA) in 2017, and the highest Z-Score value were 6.58, namely PT Industri Jamu & Farmasi Sido Muncul Tbk (SIDO) also in 2017.

#### Bankruptcy Risk Prediction Based on Z-Score

**Table 8**  
**Company Conditions Based on Z-Score Values for 2017-2021**

No	Company Code	2017	2018	2019	2020	2021
1	DVLA	Safe	Safe	Safe	Grey	Safe
2	INFO	Grey	Grey	Grey	Grey	Distress
3	KAEF	Grey	Grey	Distress	Distress	Distress
4	MERK	Grey	Grey	Safe	Grey	Safe
5	PEHA	Distress	Distress	Distress	Distress	Distress
6	PYFA	Safe	Grey	Grey	Safe	Grey
7	SCOPE	Grey	Grey	Grey	Safe	Grey



8	SIDO	Safe	Safe	Safe	Safe	Safe
9	TSPC	Safe	Safe	Safe	Safe	Grey
10	KLBF	Safe	Safe	Safe	Safe	Safe

**Source:** Processed Data, 2022

Based on the table above, two companies are in a safe condition (non-distress) for five consecutive years from 2017 to 2021, namely PT Industri Jamu & Farmasi Sido Muncul Tbk (SIDO), P PT Kalbe Farma Tbk (KLBF). Thus, these two companies are in a very safe position from the threat of bankruptcy for at least the next three years.

The company that has been in a state of distress for five consecutive years from 2017 to 2021, namely PT Pharos Tbk (PEHA), thus it can be said that the company is at high risk of going bankrupt for the next three years if management does not immediately improve the company's performance.

PT Darya Varia Laboratoria Tbk (DVLA) experienced safe conditions for three consecutive years, namely from 2017 to 2019, but in 2020 the company experienced a Gray Area condition. This shows that the company's performance has decreased, marked by a decrease in the ratios used to analyze bankruptcy risk. In 2021 the company will experience a safe conditions. This shows that the company's management managed to improve the company's condition.

PT Indofarma (Persero) Tbk (INAF) experienced a Gray Area condition for four consecutive years, from 2017 to 2020. This shows that the company is in a condition that is prone to the threat of bankruptcy. In 2021 the company will experience a Distress condition, which shows that the company has a very high potential for bankruptcy.

PT Kimia Farma Tbk (KAEF) in 2017-2018 experienced a gray area condition, then in 2019-2021, experienced a distress condition. This shows that PT Kimia Farma is experiencing declining performance and has a high risk of going bankrupt in the next three years.

PT Merck Indonesia Tbk (MERK) in 2017-2018 experienced a gray area conditions and then experienced safe conditions again in 2019. In 2020 the company experienced a gray area conditions, then in 2021 experienced safe conditions. This shows that the company's management managed to improve the company's condition.

PT. Pyridam Farma Tbk (PYFA) experienced a safe condition (non-distress) in 2017, but in 2018-2019 it experienced a gray area. Then experience Safe conditions in 2020, and in 2021 experience Gray area conditions. This shows a decrease in company performance marked by a decrease in the ratios used to analyze bankruptcy risk.

PT Merck Sharp Dohme Pharma Tbk (SCPI) experienced a gray area in 2017-2019, then experienced a non-distress condition in 2020. In 2021 the company experienced a gray area. This shows that the company experienced a decrease in fluctuating performance.

PT. Tempo Scan Pasifik Tbk has experienced safe conditions for four consecutive years, then in 2021; the company will experience a gray area. This shows that the company's performance has decreased, marked by a decrease in the ratios used to analyze bankruptcy risk.

*Summary of Discriminant Analysis Results for All Companies*

**Table 9**  
**Z-Score Ratings List**

No	Company Code	$Z = 0,717T^1 + 0,847T^2 + 3,107T^3 + 0,420T^4 + 0,998T^5$					Average	Predictions
		2017	2018	2019	2020	2021		
1	DVLA	2,99	3,31	3,31	2,82	2,93	3,07	Safe (Non Distress)
2	INFO	1,26	1,24	1,40	1,22	0,84	1,19	Distress
3	KAEF	1,74	1,37	0,80	0,84	0,85	1,12	Distress
4	MERK	2,86	1,37	2,92	2,71	3,46	2,66	Grey
5	PEHA	0,32	1,22	1,06	0,88	0,68	0,83	Distress
6	PYFA	3,01	2,76	2,85	3,27	1,37	2,65	Grey
7	SCOPE	2,49	2,49	2,81	3,39	2,86	2,81	Grey
8	SIDO	6,58	4,80	4,99	4,43	5,16	5,19	Safe (Non Distress)
9	TSPC	3,27	3,27	3,33	3,36	2,88	3,22	Safe (Non Distress)
10	KLBF	4,94	4,96	4,55	4,25	4,49	4,64	Safe (Non Distress)

**Source:** Processed Data, 2022

The Z-Score rating list for pharmaceutical companies on the Indonesia Stock Exchange for 2017-2021 shows stable and healthy results, with many companies entering a safe condition (non-distress), which shows efficient company performance. However, several companies in a state of distress must improve the performance of each component of the company's resources. Appropriate repairs will help the company's survival in the future, and the risk of the company experiencing bankruptcy will be negligible.

## CONCLUSION

Based on the results of the research discussed in the previous chapter, it can be concluded that the risk of bankruptcy for pharmaceutical companies for the 5 (five) year period 2017-2021 of the ten pharmaceutical companies sampled in this study is only 30% of companies that are predicted to experience a threat of bankruptcy (distress), the rest are companies that are predicted to be safe from the threat of bankruptcy (non-distress) by 40%, for companies that experience gray areas are as much as 30%. There are three companies in the distressed category, namely PT Indofarma (Persero) Tbk (INAF), PT Kimia Farma Tbk (KAEF), and PT Pharos Tbk (PEHA). 4 companies are in the safe (non-distress) category, namely PT Darya Varia Laboratoria Tbk (DVLA), PT Herbal Medicine & Pharmaceutical Industry Sido Muncul Tbk (SIDO), PT Tempo Scan Pasifik Tbk (TSPC), PT Kalbe Tbk (KLBF). Furthermore, there are three companies in the Grey category, namely PT Merck Indonesia Tbk (MERK), PT Pyridam Farma Tbk (PYFA), PT Merck Sharp Dohme Pharma Tbk (SCPI).

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