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ANALYSIS OF FINANCIAL DISTRESS IN PLANTATION COMPANIES ON THE INDONESIA STOCK EXCHANGE FOR THE 2018-2021 PERIOD

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Abstract:
This study aims to predict and analyze how the financial distress of companies in the plantation sector are listed on the Indonesia Stock Exchange in 2018-2021 using the Altman modified Z-Score, Springate, Zmijewski and Grover methods and to test the accuracy of financial distress predictions by calculating the level of accuracy of each number of predictions and error rates from the Altman modified Z-Score, Springate, Zmijewski and Grover methods for plantation sector companies listed on the Indonesia Stock Exchange for 2018-2021. The data analysis method used was Altman's modified Z-Score, Springate, Zmijewski, Grover, and paired sample t-test. Based on the results of the assessment of financial distress, the most accurate method for predicting financial distress in plantation sector companies listed on the Indonesia Stock Exchange is the Springate method with the highest accuracy rate of 85.00%, then the Altman Z-Score method with an accuracy rate of 57. 50%, the Grover method with an accuracy rate of 38.75% and Zmijewski with an accuracy rate of 17.50%.

JEL: Q10; Q13; M10

Keywords: financial distress, prediction, Altman Z-Score, Springate, Zmijewski, Grover

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1. Introduction

The company is an organization that has a foremost goal and of the leading objective is to acquire the maximum conceivable profit by reducing excessive production costs, but in order to grow there are certainly many obstacles faced by the company, both external and internal constraints. The task of company management is to determine a strategy so that the company will not experience a decrease in profits (Wongsosudono, Corina and Chrissa, 2013). If the company continues to experience a decline in profits, a company will soon experience financial difficulties or financial distress (Whitaker, 1999).

A company is categorized as experiencing financial distress when the company shows a performance that shows a negative operating profit, negative net profit, negative book value of equity, and the company merges (Brahmana, 2007). Companies that experience losses are companies that are unable to pay their obligations or are illiquid and may require relief in paying debts such as relief in bank/leasing installment payments. Mispredictions of the continuity of the company's operations in the future will cause lasting problems within a company, one of which is the risk of loss of income or investment that has been invested by the company (Hanifah and Purwanto, 2013).

Financial statement analysis is a tool for predicting bankruptcy in a company. Financial reports can be used as a basis for measuring the health of a company through existing financial ratios. The ratio is a comparison of elements or elements of financial statements (Margareth, 2014). Ratio analysis in many ways is able to provide indicators and symptoms as well as predictions that arise around the surrounding conditions. Financial ratios can also help evaluate company performance by comparing company financial ratios, so you can see if a company's financial condition has increased or decreased. Financial distress is a company's financial condition that occurred before bankruptcy or liquidation (Brahmana, 2007). The financial distress model really needs to be developed, because by knowing the condition of financial distress, a company will anticipate in the form of anticipatory actions that lead to bankruptcy (Sudana, 2015). Therefore, knowing earlier about the financial distress experienced by companies will make it easier for decision-makers to make changes so as not to become bankrupt.

The plantation sector is a sector that influences the Indonesian economy, because the plantation sector has a large contribution to the economy in Indonesia. Indonesia is an agricultural country and has abundant resources. Oil palm, rubber, coffee and cocoa are plantation products in Indonesia that are starting to move through the world market. Indonesia will be able to become a developed country if it has competent human resources so that it can manage existing natural resources. The following are 3 plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 periods which are indicated to be experiencing financial distress. The following is Table 1 of the total liabilities of plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 periods.

Table 1: Total liabilities of companies in registered plantation sector on the Indonesia Stock Exchange in 2018-2021

No	Code	Total Debt (in million Rp)				Total	Mean
		2018	2019	2020	2021		
1	**JAWA**	2.768.443.138	3.099.655.452	3.249.702.622	3.342.826.627	12.460.627.839	3.115.156.960
2	**MGRO**	412.324.985	658.649.334	810.546.275	1.110.402.314	2.991.922.908	747.980.727
3	**PSGO**	2.757.063.950	2.078.486.201	2.191.495.435	2.307.095.261	9.334.140.847	2.333.535.212
Total		**5.937.832.073**	**5.836.790.987**	**6.251.744.332**	**6.760.324.202**	**24.786.691.594**	**6.196.672.899**
Mean		**1.979.277.358**	**1.945.596.996**	**2.083.914.777**	**2.253.441.401**	**8.262.230.531**	**2.065.557.633**

Source: Indonesia Stock Exchange.

In Table 1 above, we can see that the total debt (total liabilities) of plantation sector companies listed on the Indonesia Stock Exchange in 2018-2021 has an average increase. Total debt (total liabilities) is the ratio used to analyze the condition of a company's financial distress. An increase in debt that occurs continuously is a symptom of a company's financial distress, this is in accordance with a quote by (Hani, 2015) which articulates a decrease in sales, and an increase in debt are signs of a company's financial distress. The following is Table 2 of data on the net profit (net profit) of plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 period.

Table 2: Net profit of companies in registered plantation sector on the Indonesia Stock Exchange in 2018-2021

No	Code	Net Profit (in million Rp)				Total	Mean
		2018	2019	2020	2021		
1	**JAWA**	-300.146.994	-282.699.235	-307.643.236	-178.278.611	-1.068.768.076	-267.192.019
2	**MGRO**	84.172.119	25.609.796	-49.586.190	-89.783.282	-29.587.557	-7.396.889
3	**PSGO**	-183.156.060	-160.987.619	26.500.634	213.841.959	-103.801.086	-25.950.272
Total		**-399.130.935**	**-418.077.058**	**-330.728.792**	**-54.219.934**	**-1.202.156.719**	**-300.539.180**
Mean		**-133.043.645**	**-139.359.019**	**-110.242.931**	**-18.073.311**	**-400.718.906**	**-100.179.727**

Source: Indonesia Stock Exchange.

From Table 2 above, we can see that the net profit value of plantation sector companies listed on the Indonesia Stock Exchange in 2018-2021 is negative as a whole; this describes the company's expenses being greater than sales or income earned in one year. So that the net profit value of the plantation sector companies listed on the Indonesia Stock Exchange in 2018-2021 is overall negative. If a company's net profit increases or is positive, the company's performance will get better; this indicates that the company is in a healthy condition, whereas if profits decrease or are negative, this indicates that the company is experiencing financial distress. This is in accordance with a quote by (Hani, 2015) which says that a decrease in profits is an indication of a company's financial distress.

Through this research, it is hoped that companies that have not experienced financial distress can predict their financial health condition using the financial distress prediction method used in this study. Based on the background description above, the authors intend to conduct research with the title "Prediction of Financial Distress

Conditions Using Discriminant Analysis in Plantation Companies Listed on the Indonesia Stock Exchange in 2018-2021.

2. Research methods

This research is categorized as a quantitative research; the research approach used in this research is descriptive research. This study uses the Altman Z-Score, Springate, Zmijewski and Grover methods in predicting company financial distress (financial distress) (Vinko, S. and Lenni, 2019). This study used 20 samples taken based on certain criteria by making the official website of the Indonesia Stock Exchange (IDX) accessed via the www.idx.co.id page as a place of research to obtain the necessary data, then classified, analyzed, and interpreted the findings results in regards to ratios to financial performance in companies in the plantation sector that are listed on the Indonesia Stock Exchange for the period 2018 – 2021. The research was conducted in February – May 2023. The test in this study used the Kolmogorov Smirnov Normality Test, namely a test by comparing the distribution of the data to be tested for normality with the standard normal distribution and the Paired Sample T-Test is a different test (comparison) analysis method that aims to determine whether there is an average difference between 2 or more paired samples. Furthermore, testing the accuracy of the prediction model was carried out; this test was intended to see how large the number of companies experienced Financial Distress from the Altman Z-Score, Springate, Zmijewski and Grover methods (Turk, & Kurklu, 2017).

2.1 Altman Z-Score method

The Altman Z-Score method that is included in calculating financial distress predictions produces the following models:

$$\mathbf{Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4}$$

Descriptions:
X1 = Ratio of working capital to total assets (Working Capital / Total Assets);
X2 = Ratio of retained earnings to total assets (Retained Earning / Total Assets);
X3 = Ratio of earnings before interest and tax to total assets (EBIT / Total Assets);
X4 = Ratio of the book value of equity to the book value of total debt (Book Value of Equity / Book Value of Total Liabilities).

The criteria for healthy and bankrupt companies are based on the Z-Score value of the Modified Altman model, namely (Rahmadhani and Lutviarman, 2009):

a) If the index value Z < 1.1 then the company is predicted to go bankrupt.
b) If the value of the Z index is 1.1-2.6 then it is included in the gray area (the company is predicted to experience financial problems and potentially going bankrupt).
c) If the Z index value is > 2.6, it is a non-bankrupt company.

2.2 Springate method

In this method, the basic calculation is obtained as follows:

$$\mathbf{Z = 1.03X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4}$$

Descriptions:
X1 = Ratio of working capital to total assets (Working Capital / Total Assets);
X2 = Ratio of earnings before interest and taxes to current debt (EBIT / Current Liabilities);
X3 = Ratio of profit before tax to current liabilities (EBT / Current Liabilities);
X4 = Ratio of sales to total assets (Sale/Total Assets);

The results of calculations using the Springate Score formula will produce different scores between one company and another. This score must be compared with the following assessment standards to assess the viability of the company:

Z > 0.862 = healthy company

Z < 0.862 = the company has the potential to go bankrupt

2.3 Zmijewski method

The Zmijewski method was discovered by Mark Zmijewski in 1984 with the following formula,

$$\mathbf{Z = -4{,}3 - 4{,}5X_1 + 5{,}7X_2 - 0{,}004X_3}$$

Descriptions:
X1 = Ratio of net profit to total assets (Net Income / Total Assets)
X2 = Ratio of total debt to total assets (EBIT / Total Liabilities)
X3 = Ratio of current assets to current liabilities (Current Assets / Current Liabilities)

The criteria used by Zmijewski (Saragih, & Dewi, 2019) are:

a) If the calculation produces a positive value, the company has the potential to go bankrupt (Financial Distress).
b) If the calculation produces a negative value, then the company does not have the potential to go bankrupt (Non-Financial Distress)

2.4 Grover's method

The Grover method was invented by Jeffrey S. Grover by redesigning the Altman Z-Score method to produce the following formula:

$$\mathbf{G\text{-}Score = 1{,}650X_1 + 3{,}404X_2 - 0{,}016ROA + 0{,}057}$$

Descriptions:
X1 = Ratio of working capital to total assets (Working Capital / Total Assets);
X2 = Profit before interest and tax ratio to total assets (Ebit / Total Assets);
ROA = Ratio of net profit to total assets (EBIT / Total Assets).

The Grover method has a score less than or equal to -0.02 ($G \leq -0.02$) a company is said to be bankrupt while a company is said to be not bankrupt if it has a score greater than or equal to 0.01 ($G \geq 0.01$).

2.5 Kolmogorov Smirnov test analysis

This analysis is a statistical method used to examine the comparison of two or more independent samples with ordinal data forms arranged in a cumulative frequency distribution table with a class interval system. This test does not generate a lot of perceptions among observers where this happens a lot in graphic-based normality tests, besides that testing using this test is also relatively simple. The application of the Kolmogorov Smirnov test if the ordinary test is significant < 0.05 means there is a significant difference and if > 0.05 no significant difference arises, this application also applies to the Kolmogorov Smirnov test. In this test the data is not normally distributed if $p < 0.05$ and the data is normally distributed if $p > 0.05$.

2.6 Analysis of paired samples t-test

This analysis is a type of average difference test, which tests whether there is an average difference between two or more sample groups. Decision-making in this test is based on a comparison of probability values (Sig.2-tailed). If the probability (in this case the Sig.2-tailed value) is > 0.05, then there is no significant difference in the average between the two sample groups. However, if the probability (in this case the Sig.2-tailed value) is <0.05, then there is a significant average difference between the sample groups. Testing was carried out using a significance level of 0.05 (5%).

2.7 Analysis test the accuracy of predictions

The accuracy level of each model is calculated in the following way:

Accuracy Level = (Number of correct predictions / Number of Samples) x 100%

Apart from the accuracy of each model, what is also taken into consideration is the error rate. Errors are divided into two types, namely Type I and Type II. Type I error is an error that occurs when the model predicts that the sample will not experience distress when in fact it is experiencing distress. Type II error is an error that occurs when the model predicts that the sample is experiencing distress when in fact it is not experiencing distress. The error rate is calculated in the following way:

Type I Error = (Number of Type I errors / Number of Samples) x 100%

Type II Error = (Number of Type II errors / Number of Samples) x 100%

3. Results and Discussion

The data collected in this study is secondary data in the form of company financial reports (Annual Report) for the plantation sector which are listed on the Indonesian stock exchange for 2018-2021. Secondary data in general can be interpreted as data obtained through a second or third party. To obtain data, researchers can download data via www.idx.co.id. Based on the sample criteria previously stated, 20 samples of plantation sector companies listed on the Indonesian stock exchange for 2018-2021 were obtained.

Table 3: Descriptive statistics

Method	N	Minimum	Maximum	Mean	St. deviation
Altman	80	-63,86064813	51,68107774	0,251896122	11,76683448
Springate	80	-3,285429115	3,036324647	0,192225062	0,953008099
Zmijewski	80	-6,250950215	33,00677636	-0,994877429	4,503794539
Grover	80	-4,038187124	1,609710464	0,062092837	0,827755171
Valid N	80				

Based on Table 3, the purpose of the descriptive statistical test results according to (Ghozali, 2008) is to see the quality of research data can be seen from the numbers or values contained in the mean and standard deviation. If the mean value is greater than the standard deviation value, the data quality is better. The standard deviation is a measure of the difference between the sample values and the mean. It concludes as the lower the standard deviation, the closer the mean and vice versa, the higher the standard deviation, the more diverse the sample. From Table 3 above we can see that the descriptive statistical results of the dependent variable have the largest mean value, which is 0.251896122 and the largest variable, the standard deviation, which is 11.76683448, so the samples produced will vary.

3.1 Altman Z-Score calculated data

The results of the analysis using the Altman Z-Score method for plantation sector companies listed on the Indonesia Stock Exchange in 2018 were 12 companies (financial distress), then there were 2 companies (gray area) while 6 companies (non-financial distress). In 2019 there were 13 companies (financial distress), then there were 3 companies (gray area), while 4 (non-financial distress). Based on the results of the analysis in 2020, there were 12 companies (financial distress), then there were 3 companies (gray area), while 5 companies (non financial distress). In 2021 there will be 9 companies (financial distress), then there will be 3 companies (grey area), while 8 companies (non-financial distress). In the results of calculations and analysis by inputting the ratio contained in the Altman Z-Score method multiplied by the coefficient determined according to the formulation of the Altman Z-Score method for plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 period, 46

companies experienced difficulties financial distress (financial distress) and obtained 23 companies experiencing financial difficulties with a mild stage (grey area).

3.2 Springate calculation data

The results of the analysis using the Springate method for plantation sector companies listed on the Indonesia Stock Exchange in 2018 were 19 companies (financial distress). While 1 company (non financial distress). In 2019 there were 19 companies (financial distress). While 1 company (non financial distress). In 2020 there are 17 companies (financial distress). While 3 companies (non financial distress). In 2021 there will be 13 companies (financial distress). While 7 companies (non financial distress). In the results of calculations and analysis by inputting the ratio contained in the Springate method multiplied by the coefficient determined according to the formulation of the Springate method for plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 period, 68 companies are experiencing financial distress (financial distress) and obtained 12 companies in healthy conditions (non-financial distress).

3.3 Zmijewski's calculated data

The results of the analysis using the Zmijewski method for plantation sector companies listed on the Indonesia Stock Exchange in 2018 were 3 companies (financial distress). While 17 companies (non financial distress). In 2019 there were 4 companies (financial distress). While 16 companies (non financial distress). In 2020 there will be 3 companies (financial distress). While 17 companies (non financial distress). In 2021 there will be 4 companies (financial distress). While 16 companies (non financial distress). In the results of calculations and analysis by inputting the ratio contained in the Zmijewski method which is multiplied by the coefficient determined according to the Zmijewski method formulation for plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 period, 14 companies are experiencing financial distress and obtained 66 companies in healthy condition (non-financial distress).

3.3 Grover's calculated data

The results of the analysis using the Grover method for plantation sector companies listed on the Indonesia Stock Exchange in 2018 were 8 companies (financial distress). While 12 companies (non financial distress). In 2019 there were 8 companies (financial distress). While 12 companies (non financial distress). In 2020 there are 10 companies (financial distress). While 10 companies (non financial distress). In 2021 there will be 5 companies (financial distress), while 15 companies (non-financial distress). In the results of calculations and analysis by inputting the ratio contained in the Grover method multiplied by the coefficient determined according to the formulation of the Grover method for plantation sector companies listed on the Indonesia Stock Exchange for the 2018-2021 period, 31 companies are experiencing financial distress (financial distress) and obtained 49 companies in healthy conditions (non financial distress)

The level of accuracy is based on the prediction method for the plantation sector listed on the Indonesia Stock Exchange in 2018-2021.

Table 4: Level of accuracy

Prediction method	Financial distress	Grey area	Non-financial distress
Altman Z-score	46	11	23
Springate	68	-	12
Zmijewski	14	-	66
Grover	31	-	49
Total	159	11	150

Based on Table 4, it shows that the condition of financial distress experienced by 159 companies is a unscrupulous thing in the financial management of a company, to see the level of success of companies in achieving goals, a performance measure is needed. Future company performance will then determine the company's ability to compete with other companies. If this is done correctly, the company will be able to avoid financial distress.

3.4 Paired Sample Descriptive Statistics T-Test

Table 5: Paired Sample Descriptive Statistics T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	ALTMAN	.2519	80	11.76683	1.31557
	SPRINGATE	.1922	80	.95301	.10655
Pair 2	ALTMAN	.2519	80	11.76683	1.31557
	ZMIJEWSKI	-.9949	80	4.50379	.50354
Pair 3	ALTMAN	.2519	80	11.76683	1.31557
	GROVER	.0621	80	.82776	.09255
Pair 4	SPRINGATE	.1922	80	.95301	.10655
	ZMIJEWSKI	-.9949	80	4.50379	.50354
Pair 5	SPRINGATE	.1922	80	.95301	.10655
	GROVER	.0621	80	.82776	.09255
Pair 6	ZMIJEWSKI	-.9949	80	4.50379	.50354
	GROVER	.0621	80	.82776	.09255

If the mean value is greater than the standard deviation value, the data quality is better. The standard deviation is a measure of the difference between the sample values and the mean. The lower the standard deviation, the closer the mean and vice versa, the higher the standard deviation, the more diverse the sample.

Based on Table 5 above, it can be seen that the total number of samples for the altman Z-Score, Springate, Zmijewski and Grover methods totaled 80 samples with a mean Altman value of 0.2519, Springate of 0.1922, Zmijewski of -0.9949 and Grover of 0 .0621. The standard deviation for the Altman method is 11.76683, Springate is 0.95301, Zmijewski is 4.50379 and Grover is 0.82776.

From Table 5 above we can see that the results of the descriptive statistics of the four methods have the largest value at the mean, which is 0.2519 and the largest variable at the standard deviation, namely 11.76683, so the samples produced will vary.

3.5 Paired Sample T-Test

Table 6: Paired Sample T-Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	ALTMAN - SPRINGATE	.05967	11.49151	1.28479	-2.49764	2.61698	.046	79	.963
Pair 2	ALTMAN - ZMIJEWSKI	1.24677	13.20079	1.47589	-1.69092	4.18447	.845	79	.401
Pair 3	ALTMAN - GROVER	.18980	11.50416	1.28620	-2.37032	2.74993	.148	79	.883
Pair 4	SPRINGATE - ZMIJEWSKI	1.18710	4.81339	.53815	.11593	2.25827	2.206	79	.030
Pair 5	SPRINGATE - GROVER	.13013	.46859	.05239	.02585	.23441	2.484	79	.015
Pair 6	ZMIJEWSKI - GROVER	-1.05697	4.78633	.53513	-2.12212	.00818	-1.975	79	.052

Pair 1 testing shows the value of Sig. (2-tailed) in pair 1, namely between the Altman and Springate models, is 0.963. That means the probability is > 0.05, which means that there is no significant difference between the two sample groups with a 95% confidence level.

Pair 2 testing shows the value of Sig. (2-tailed) in pair 2, namely between the Altman and Zmijewski models, is 0.401. That means the probability is > 0.05, which means that there is no significant difference between the two sample groups with a 95% confidence level.

Pair 3 testing shows the value of Sig. (2-tailed) in pair 3, namely between the Altman and Grover models, is 0.883. That means the probability is > 0.05, which means that there is no significant difference between the two sample groups with a 95% confidence level.

Pair 4 testing shows the value of Sig. (2-tailed) in pair 4, namely between the Springate and Zmijewski models, is 0.030. That means the probability is > 0.05, which means that there is no significant difference between the two sample groups with a 95% confidence level.

Pair 5 testing shows the value of Sig. (2-tailed) in pair 5, namely between the Springate and Grover models, is 0.015. That means the probability is > 0.05, which means that there is no significant difference between the two sample groups with a 95% confidence level.

Pair 6 testing shows the value of Sig. (2-tailed) in pair 6, namely between the Zmijewski and Grover models, is 0.052. That means the probability is > 0.05, which means

that there is no significant difference between the two sample groups with a 95% confidence level.

3.6 Prediction Model Accuracy Test

3.6.1. Altman Z-Score method

Table 7: The prediction accuracy of the Altman model

Correct Prediction		**False Prediction**	
Year	**Correct**	**Category Sample I**	**Category Sample II**
2018	12	1	3
2019	13	0	4
2020	12	0	3
2021	9	3	1
Number	46	4	11
Total Sample	80	48	32
Accuracy Level	**57,50 %**		
Error Type I		**8,33 %**	
Error Type II			**34,375%**

In Table 7 we can see that the accuracy rate obtained using the Altman method is 57.50%. This calculation is the total for 80 samples consisting of category 1 samples and category 2 samples. Category 1 samples, which are samples of companies experiencing financial distress, consist of 48 samples. In the prediction results using the Altman method, there are 44 data samples that are predicted to be in true financial distress, while the remaining 4 data samples are predicted to be in non-financial distress. The 2nd category sample, which is a sample of companies experiencing non-financial distress, consists of 32 samples. In the prediction results using the Altman method, there are 21 data samples that are predicted to be in true non-financial distress, while the remaining 11 data samples are predicted to be in financial distress. Table 7 shows the results of calculating the error rate in each category, namely the type 1 error for the Altman model is 8.33% and the calculation for type 2 error is 34.375%. The calculation shows the level of prediction error produced by the Altman model.

3.6.2. Springate method

In Table 8 we can see that the accuracy rate obtained using the Springate method is 85.00%. This calculation is the total for 80 samples consisting of category 1 samples and category 2 samples. Category 1 samples, which are samples of companies experiencing financial distress, consist of 48 samples. In the prediction results using the Springate method, there are 46 data samples in true financial distress, while the remaining 2 data samples are in non-financial distress. The 2nd category sample, which is a sample of companies experiencing non-financial distress, consists of 32 samples. In the prediction results using the Springate method, there are 10 data samples in a true non-financial distress condition, while the remaining 22 data samples are in a financial distress condition. The results of the calculation of the error rate in each category, namely the type

1 error for the Springate model is 4.16% and the calculation for type 2 error is 68.75%. The calculation shows the level of prediction error generated by the Springate model.

Table 8: Springate model's predictive accuracy

Correct Prediction		**False Prediction**	
Year	**Correct**	**Category Sample I**	**Category Sample II**
2018	19	0	7
2019	19	0	7
2020	17	1	6
2021	13	1	2
Number	68	2	22
Total Sample	80	48	32
Accuracy Level	**85,00 %**		
Error Type I		**4,16 %**	
Error Type II			**68,75%**

3.6.3. The Zmijewski method

Table 9: The prediction accuracy of the Zmijewski model

Correct Prediction		**False Prediction**	
Year	**Correct**	**Category Sample I**	**Category Sample II**
2018	3	9	0
2019	4	8	0
2020	3	9	0
2021	4	8	0
Number	14	34	0
Total Sample	80	48	32
Accuracy Level	**17,50 %**		
Error Type I		**70,83 %**	
Error Type II			**0,00%**

In Table 9 we can see that the accuracy rate obtained using the Zmijewski method is 17.50%. This calculation is the total for 80 samples consisting of category 1 samples and category 2 samples. Category 1 samples, which are samples of companies experiencing financial distress, consist of 48 samples. In the prediction results using the Zmijewski method, there are 14 data samples in true financial distress, while the remaining 34 data samples are in non-financial distress. The 2nd category sample, which is a sample of companies experiencing non-financial distress, consists of 32 samples. In the prediction results using the Zmijewski method, there are 32 data samples in true non-financial distress, while 0 data samples are in financial distress. The results of the calculation of the error rate in each category, namely the type 1 error for the Zmijewski model is 70.83% and the calculation for type 2 error is 0.00%. This calculation shows the level of prediction error produced by the Zmijewski model.

3.6.4. The Grover method

Table 10: The predictive accuracy of the Grover model

Correct Prediction		False Prediction	
Year	**Correct**	**Category Sample I**	**Category Sample II**
2018	8	4	0
2019	8	5	1
2020	10	3	1
2021	5	7	0
Number	31	19	2
Total Sample	80	48	32
Accuracy Level	**38,75 %**		
Error Type I		**39,58 %**	
Error Type II			**6,25%**

In Table 10 we can see that the accuracy rate obtained using the Grover method is 38.75%. This calculation is the total for 80 samples consisting of category 1 samples and category 2 samples. Category 1 samples, which are samples of companies experiencing financial distress, consist of 48 samples. In the prediction results using the Grover method, there are 29 data samples in true financial distress, while the remaining 19 data samples are in non-financial distress. The 2nd category sample, which is a sample of companies experiencing true non-financial distress, consists of 32 samples. In the prediction results using the Grover method, there are 30 data samples in a true non-financial distress condition, while the remaining 2 data samples are in a financial distress condition. The results of calculating the error rate in each category are error type 1 for the Grover model of 39.58% and calculations for type 2 error of 6.25%. This calculation shows the level of prediction error produced by the Grover model. The accuracy rate using the Grover method is 38.75%.

3.7 Recapitulation of the results of calculating the accuracy of the prediction model

Table 11: Recapitulation of Accuracy of Prediction Methods

Prediction model	Accuracy rate
Altman Z-Score	57,50%
Springate	85,00%
Zmijewski	17,50%
Grover	38,75%

Based on Table 11, we can see that the first highest level of accuracy is the Springate method with an accuracy rate of 85.00%, then followed by using the Altman Z-Score method with an accuracy rate of 57.50%. Followed by the Grover method with an accuracy rate of 38.75% and the Zmijewski method with an accuracy rate of 17.50%.

3. Conclusion

This study aims to identify whether there are differences in predictions between the Altman Z-Score method with the Springate method, the Altman method with the Zmijewski method and the Altman method with the Grover method. two conditions, namely financial distress and non-financial distress, and analyzing the conditions of financial distress in plantation sector companies listed on the Indonesia Stock Exchange in 2018-2021, as well as measuring the level of accuracy, Error Type 1, Error Type 2 of the four methods that have been tested namely the Altman Z-Score method, the Springate method, the Zmijewski method and the Grover method. Based on the results of the analysis using the Altman Z-Score method, the Springate method, the Zmijewski method and the Grover method, it can be concluded as follows:

1) Based on the results of the assessment of financial distress using the Altman Z-Score method, 12 out of 20 samples of plantation companies listed on the Indonesia Stock Exchange experienced financial distress. This means the Altman Z-Score method can be used to predict financial distress well.
2) Based on the results of an assessment of financial distress using the Springate method, 17 of the 20 plantation companies listed on the Indonesia Stock Exchange experienced financial distress. This means the Springate method can be used to predict financial distress well.
3) Based on the results of the assessment of financial distress using the Zmijewski method, there are 3 out of 20 samples of plantation companies listed on the Indonesia Stock Exchange experiencing financial distress. This means the Zmijewski method can be used to predict financial distress well.
4) Based on the results of an assessment of financial distress using the Grover method, there were 9 out of 20 samples of plantation companies listed on the Indonesia Stock Exchange experiencing financial distress. This means the Grover method can be used to predict financial distress well.
5) The most appropriate and accurate method for predicting financial distress in plantation sector companies listed on the Indonesia Stock Exchange is the Springate method with the highest accuracy rate of 85.00%, then the second is the Altman Z-Score method with an accuracy rate of 57. 50% and finally the Grover method with an accuracy rate of 38.75% and Zmijewski with an accuracy rate of

Conflict of Interest Statement
The authors declare no conflicts of interest.

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