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Implementation of Springate, Altman, Grover and Zmijewski Models in Measuring Financial Distress

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ABSTRACT

One of the strategies carried out by the company is to avoid the occurrence of a level of financial difficulties (financial distress). The goal of the study was to determine bankruptcy predictions and find out the most accurate methods for measuring bankruptcy among Springate, Altman, Grover and Zmijewski models. The data collection techniques used are documentation techniques while the data analysis techniques used are qualitative descriptive analysis techniques and comparative analysis techniques. The results showed that there was a predictive difference between Springate, Altman, Grover and Zmijewski models in predicting bankruptcy (financial distress). The Altman model is the most accurate prediction model in predicting bankruptcy with the highest degree of accuracy which then continued the Springate model, Grover model and finally the Zmijewski model. The renewal of previous research is to use four methods of predicting bankruptcy at once, different research objects and times from previous researchers.

1. INTRODUCTION

Companies that have improved company performance will have good prospects in the future. In addition, the company also needs some good strategy and planning to stay afloat in running its business. One of the strategies carried out by the company is to avoid the occurrence of a level of financial difficulties (financial distress). Financial distress is a condition of economic crisis because the company experienced a significant level of loss in the last few years and was unable to pay its obligations at maturity. There are several ways or methods to measure the level of financial distress that will have an impact on potential bankruptcy, namely, the Springate, Altman, Grover and Zmijewski methods. The object in this study is the Transportation Sub-Sector Company listed on the Indonesia Stock Exchange. The company is engaged in community transportation services for mobility and transportation of goods throughout the region. The following is presented a graph of the performance movement of one of the transportation companies (CMPP) juxtaposed with JCI.

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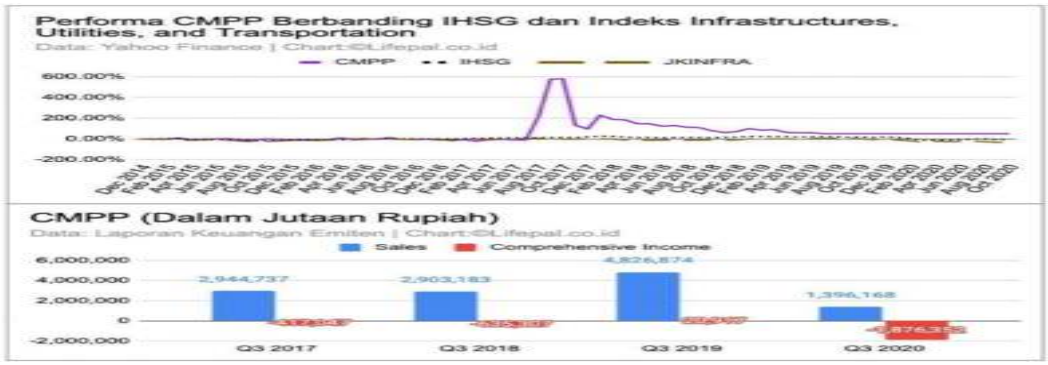

Source: (Jonathan, 2020)

Figure1. Movement of Transportation Sector Performance and JCI

The graph above shows that CMPP's financial statements, recorded a downward trend in sales during the Covid-19 pandemic amounted to -71.08% or 1.39 trillion rupiah in the third quarter of 2020 from 4.82 trillion rupiah in the third quarter of 2019. In terms of comprehensive profit, in the third quarter of 2020, CMPP recorded a loss of -1.87 trillion rupiah. This is due to a decrease in sales caused by large-scale social restriction policies and a decrease in financial income in the third quarter of 2020. Therefore, the authors are interested in conducting in-depth research on Transportation Sub-Sector Companies to find out the prediction of bankruptcy and find out the most accurate methods for measuring bankruptcy among springate, altman, grover and zmijewski models.

The results of the study concluded by (Prasandri, 2018), (KÜRKLÜ and Zeynep, 2017), (Rahayu et al., 2016), and (Susanti, 2016), Altman and Springate's model is more accurate than Grover or Zmijewski's. In other respects, the results of unequal studies are shown (Sumarna, Yazid and Ichwanudin, 2020), (Purnomo and Hendratno, 2019), (Sudrajat and Wijayanti, 2019) and (Yuliastary and Wirakusuma, 2014) Zmijewski and Gover are the most accurate models used in detecting unhealthy or potentially bankrupt conditions. There is inconsistency from previous studies that have been done by showing results that are not the same. Based on this, researchers want to conduct re-research on the implementation of Springate, Altman, Grover and Zmijewski models in measuring bankruptcy in transportation sub-sector companies listed on the Indonesia Stock Exchange.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Financial Distress

Financial distress is a condition in which a company experiences financial difficulties ranging from mild to more serious levels due to the company's inability to meet its financial obligations at maturity, allowing bankruptcy. In addition, financial distress can be interpreted as a situation where the company is experiencing financial difficulties so that financial distress is defined as a condition when the company can no longer meet obligations to third parties (Maimunah and Ali Kesuma, 2020). According to (Hanafi, 2016), Financial distress is a continuum condition ranging from mild financial difficulties (such as liquidity problems), to more serious financial difficulties, namely not solveable (greater debt compared to assets).

According to (Utari, Ari and Darsono, 2016), A company's failure is the inability to achieve goals and objectives that have been set and have not constituted the destruction of a business organization. In general, a business organization can fail due to poor managerial ability, inability to manage the market, inability to manage production processes, inability to manage finances and inability to manage finances.

Model Springate (Springate Score)

The Springate method is a model using Multiple Discriminate Analysis (MDA) that requires more than one financial ratio relating to a company's bankruptcy to form a good model. (Rudianto, 2013) Springate score is a method of predicting the survival of a company by combining several common financial ratios with different weights from one another. The formula used in the Springate Score model for different types of companies is S = 1.03A + 3.07B + 0.66C + 0.4D. The financial distress parameters in this model consist of A = net working capital and total assets, B = EBIT and total assets, C = EBIT and total current liabilities, as well as D = sales and total assets. The standard rating in the Springate Score formula is S > 1.062 = healthy condition, 0.862 < S < 1,062 = prone condition and S < 0.862 = serious condition (bankrupt).

Model Altman (Z-Score)

Rudianto (2013), Z-Score analysis is a method of predicting the survival of a company by combining several common financial ratios and giving different weights to each other. The Z-Score formula used for various types of corporate business fields, both public and those that are not, and suitable for use in developing countries is Z = 6.56 X1 + 3.26 X2 + 6.72 X3 + 1.05 X4. The financial distress parameters in this model are X1 = net working capital and total assets, X2 = retained earnings and total assets, X3 = EBIT and total assets, and X4 = equity book value and debt book value. The standard Z-Score score scoring is Z > 2.6 = Safe Zone, 1.1 < Z < 2.6= Gray Zone and Z < 1.1= Dangerous Zone. The greater the value of "Z", the greater the guarantee of the company's survival and the less the risk of failure.

Model Grover

The Grover model is a method created by designing and reassessing the Altman Z-Score model (Syahyunan, 2015). Grover uses the 3 financial ratios that are considered to most affect a company's bankruptcy. Grover's formula used is G = 1,650 X1 + 3,404 X2 + 0.016 ROA. The financial distress parameters in this model are X1 = working capital and total assets, X2 = EBIT and total assets, ROA = EAT and total assets. The standard G-Score scoring is G ≤ -0.02 = potential bankruptcy and G ≥ 0.01 = healthy condition.

Model Zmijewski

Zmijewski uses ratio analysis that measures a company's performance, leverage, and liquidity in predicting bankruptcy. (Rudianto, 2013), Zmijewski Score is a method of predicting the survival of a company by combining several general financial ratios that give different weights to each other. This model emphasizes the amount of debt as the most influential component of bankruptcy. The Zmijewski Score formula used is Z = -4.3 - 4.5 X1 + 5.7 X2 + 0.004 X3. The financial distress parameters in this model are X1 = net income and total assets, X2 = total debt and total assets, X3 = lancer assets and current debt. The standard Z-Score score rating is Z > 0 = potential bankruptcy and Z ≤ 0 = healthy condition.

Tingkat Akurasi

To find out the level of accuracy and Type Error in all three methods (Rizkyansyah and Laily, 2018), Then use the formula as follows:

1. Accuracy Rate = $\frac{\text{Number of Correct Predictions}}{\text{Sample Count}} \times 100\%$
2. Type Error = $\frac{\text{Number of Incorrect Predictions}}{\text{Number of samples}} \times 100\%$

The basic assumptions in this study are as follows:
Altman's model is the most accurate model in predicting bankruptcy in Transportation Sub-Sector Companies listed on the Indonesia Stock Exchange.

3. RESEARCH METHOD

Data collection techniques used are documentation techniques by searching for data through books, financial statements, journals, previous research, and electronic media. The population in this study is all companies listed on the Indonesia Stock Exchange as companies engaged in the Transportation Sub Sector listed on the Indonesia Stock Exchange as many as 46 companies and sampling techniques carried out are purposive sampling techniques so that 28 companies are obtained as samples. The data analysis techniques used are qualitative descriptive analysis techniques and comparative analysis techniques.

4. RESULTS

Springate Score Analysis

The results of financial distress analysis data using the Springate Score Model in Telecommunications Sub-Sector Companies can be seen in Table 1 below.

Table 1. Hasil Model Springate Score

	Springate (S-Score)					Springate (S-Score)			
KODE	S Score 2019	Ket.	S Score 2020	Ket.	KODE	S Score 2019	Ket.	S Score 2020	Ket.
ASSA	0.677	B	0.738	B	MBSS	0.553	B	0.151	B
BBRM	-0.221	B	0.282	B	MIRA	0.343	B	0.084	B
BIRD	0.839	B	0.062	B	NELY	2.109	TB	1.888	TB
BLTA	0.376	B	0.384	B	PTIS	0.727	B	0.619	B
BULL	0.652	B	0.608	B	RIGS	0.669	B	0.519	B
CANI	1.215	TB	1.731	TB	SDMU	0.568	B	0.895	TB
CMPP	1.798	TB	0.537	B	SMDR	1.250	TB	1.006	TB
GIAA	1.275	TB	0.109	B	SOCI	0.542	B	0.812	B
HITS	0.914	TB	0.798	B	TAXI	-0.210	B	-0.898	B
IATA	0.355	B	0.468	B	TMAS	0.716	B	0.571	B
INDX	0.374	B	0.195	B	TPMA	1.033	TB	0.846	B
KARW	2.672	TB	2.702	TB	WEHA	0.629	B	-0.484	B
LEAD	-0.261	B	-0.217	B	WINS	-0.001	B	-0.209	B
LRNA	0.271	B	-0.522	B	ZBRA	3.206	TB	2.954	TB

Source: Processed Data, 2021

Based on the data in Table 1, it can be known that the results of the Springate Score Model calculation show that from the overall data, there are 41 values that are in the bankrupt category and the remaining 15 values are in the category of not bankrupt.

Altman Z-Score Analysis

The results of financial distress analysis data using the Altman Z-Score Model in Telecommunications Sub-Sector Companies can be seen in Table 2 below. Based on the data in Table 2, it can be known that the calculation of the Altman Score Model shows that from the overall data available, there are 48 values that are in the bankrupt category, 7 values in the grey area category and the remaining 1 value is in the category of not bankrupt.

Table 2. Altman Z-Score Model Results

	Altman (Z-Score)					Altman (Z-Score)			
KODE	Z Score 2019	Ket.	Z Score 2020	Ket.	KODE	Z Score 2019	Ket.	Z Score 2020	Ket.
ASSA	0.739	B	0.792	B	MBSS	1.401	B	1.124	B
BBRM	-0.226	B	0.027	B	MIRA	2.301	GA	2.269	GA
BIRD	1.055	B	0.567	B	NELY	2.558	GA	2.274	GA
BLTA	-13.443	B	-13.956	B	PTIS	0.945	B	0.884	B
BULL	0.760	B	0.904	B	RIGS	1.291	B	3.775	TB
CANI	-1.304	B	-2.365	B	SDMU	0.398	B	-0.279	B
CMPP	2.757	GA	-2.896	B	SMDR	1.281	B	1.287	B
GIAA	0.804	B	-0.446	B	SOCI	0.749	B	1.124	B
HITS	1.083	B	0.857	B	TAXI	-4.372	B	-7.070	B
IATA	0.585	B	-0.350	B	TMAS	0.666	B	1.051	B
INDX	1.830	GA	1.473	B	TPMA	1.515	B	1.427	B
KARW	-4.151	B	-3.947	B	WEHA	0.961	B	-0.034	B
LEAD	-0.046	B	0.029	B	WINS	0.204	B	0.289	B
LRNA	2.364	GA	1.186	B	ZBRA	-13.324	B	-12.324	B

Source: Processed data, 2021

Grover Analysis

The results of financial distress analysis data using the Grover Model on Telecommunications Sub-Sector Companies can be seen in Table 3 below:

Table 3. Grover Model Results

	Grover (G-Score)					Grover (G-Score)			
KODE	Z Score 2019	Ket.	Z Score 2020	Ket.	KODE	Z Score 2019	Ket.	Z Score 2020	Ket.
ASSA	0,103	TB	0,005	TB	MBSS	0,666	TB	0,363	TB
BBRM	-0,030	B	-1,421	B	MIRA	0,283	TB	0,019	TB
BIRD	0,269	TB	0,087	TB	NELY	0,779	TB	0,726	TB
BLTA	0,069	TB	-0,081	B	PTIS	0,483	TB	0,621	TB
BULL	0,463	TB	0,459	TB	RIGS	0,368	TB	0,414	TB
CANI	-1,886	B	-3,073	B	SDMU	-0,227	B	-0,980	B
CMPP	-0,614	B	-2,818	B	SMDR	0,598	TB	0,612	TB
GIAA	-0,617	B	-1,216	B	SOCI	0,420	TB	0,356	TB
HITS	0,287	TB	0,044	TB	TAXI	-3,580	B	-4,103	B
IATA	-0,302	B	-0,580	B	TMAS	-0,176	B	0,077	TB
INDX	0,671	TB	0,503	TB	TPMA	0,444	TB	0,339	TB
KARW	-4,100	B	-3,867	B	WEHA	0,108	TB	-0,704	B
LEAD	0,045	TB	0,197	TB	WINS	-0,287	B	-0,025	B
LRNA	0,513	TB	-0,094	B	ZBRA	-3,483	B	-4,160	B

Source: Processed Data, 2021

Based on the data in Table 3, it can be known that the results of the Grover Model calculation show that from the overall data, there are 24 values that are in the bankrupt category and the remaining 32 values are in the category of not bankrupt.

Zmijewski's Analysis

The results of financial distress analysis data using the Zmijewski Model in Telecommunications Sub-Sector Companies can be seen in Table 4 below.

Table 4. Zmijewski Model Results

	Zmijewski (Z-Score)					Zmijewski (Z-Score)			
KODE	S Score 2019	Ket.	S Score 2020	Ket.	KODE	S Score 2019	Ket.	S Score 2020	Ket.
ASSA	-0,256	TB	-0,240	TB	MBSS	-3,114	TB	-2,833	TB
BBRM	0,323	B	1,651	B	MIRA	-2,356	TB	-2,209	TB
BIRD	-2,938	TB	-2,605	TB	NELY	-4,016	TB	-3,926	TB
BLTA	-1,131	TB	-0,950	TB	PTIS	-1,246	TB	-1,274	TB
BULL	-1,712	TB	-1,211	TB	RIGS	-3,444	TB	-3,904	TB
CANI	3,485	B	6,664	B	SDMU	0,811	B	2,252	B
CMPP	1,232	B	6,167	B	SMDR	-0,791	TB	-0,977	TB
GIAA	0,473	B	3,460	B	SOCI	-1,428	TB	-1,895	TB
HITS	-0,647	TB	-0,600	TB	TAXI	9,394	B	14,575	B
IATA	-1,573	TB	0,352	B	TMAS	-0,801	TB	-0,458	TB
INDX	-3,750	TB	-3,525	TB	TPMA	-2,965	TB	-2,916	TB
KARW	10,780	TB	10,657	B	WEHA	-1,884	TB	-0,959	TB
LEAD	0,130	B	-0,026	TB	WINS	-1,863	TB	-1,923	TB
LRNA	-3,408	TB	-2,478	TB	ZBRA	11,488	B	11,553	B

Source: Processed data, 2021

Based on the data in Table 4, it can be known that the calculations of the Zmijewski Model show that from the overall data, there are 17 values that are in the bankrupt category and the remaining 39 values are in the category of not bankrupt.

Accuracy Calculation

In the calculation of accuracy, it is necessary to know clearly and definitively the data related to financial distress calculations using the Springate, Altman, Grover and Zmijewski models in the Transportation Sub Sector Company. This can be seen in Table 5.

Table 5. Springate, Altman, Gover and Zmijewski Value Accuracy Comparison Rate

Category	Percentage of Methods			
	Springate Score	Altman Z-Score	Grover	Zmijewski
Not Bankrupt/Healthy (TB)	27,00 %	1,80 %	57,00 %	70,00 %
Grey Area (GA)		12,50%		
Bankruptcy (B)	73,00 %	85,70%	43,00%	30,00%

Source: Data processed, 2021

Based on Table 5 it can be known that each model produces different values to measure bankruptcy in Telecommunications Sub-Sector Companies listed on the Indonesia Stock Exchange. However it can be obvious that each model shows a high enough percentage for a potentially bankrupt category (B). Springate's method shows a predicted bankruptcy yield of 73%, Altman Z-Score provides a bankruptcy measurement rate of 85.70%, Grover produces a potential bankruptcy value of 43%, which is greater when compared to Zmijewski's method of predicting bankruptcy at 30%. Thus it can be concluded that the Altman Z-Score model is the method that produces the highest potential bankruptcy value while the lowest value is in the Grover model. Therefore, it can be concluded that the proper method for measuring bankruptcy rates in Transportation Sub-Sector Companies is the Altman Score method because the percentage rate that is in the dangerous zone is highest compared to other models. The results of this study are different from the results of the study (Sumarna, Yazid and Ichwanudin, 2020), (Purnomo and Hendratno, 2019), (Sudrajat and Wijayanti, 2019) and (Yuliastary and Wirakusuma, 2014) Grover and Zmijewski's model is more accurate at predicting bankruptcy than the Springate and Altman models.

If this goes on continuously and there is no anticipated action from the company, it can cause the company to actually go into bankruptcy. Therefore, all parties concerned, both managers and investors, can find the right solution immediately to improve the company's performance in the future.

5. CONCLUSION

The results showed that there was a difference in predictions between the Springate, Altman, Grover and Zmijewski models in predicting bankruptcy (financial distress) in Transportation Sub-Sector Companies listed on the Indonesia Stock Exchange. The Altman model became the most accurate prediction model with an accuracy rate of 85.75% followed by the Springate model with an accuracy rate of 73%, the Grover model by 43% and finally the Zmijewski model with the lowest mortality rate of 30%. Thus the basic assumption that the Altman Model is the most accurate model in predicting bankruptcy in transportation sub-sector companies listed on the Indonesia Stock Exchange is acceptable. We recommend that all relevant and interested parties such as managers and investors in Telecommunications Sub-Sector Companies listed on the Indonesia Stock Exchange can immediately find the right solution to improve the company's performance in the future so that the company does not actually experience bankruptcy.

6. LIMITATION

With respect to the limitations of the author, this study still has some weaknesses and has not used the entire existing bankruptcy model. Therefore, the authors expect future research to add to or use other models in predicting bankruptcy such as the Fulmar, Ohlson and Taffler models and examine other factors beyond the author's control such as inflation and unemployment. In addition, researchers can further replace variables or add years, so it is expected to get maximum research results in the future.

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