COSTING:Journal of Economic, Business and Accounting
Volume 7 Nomor 4, Tahun 2024
e-ISSN : 2597-5234

PREDICTION OF FINANCIAL DISTRESS LEVELS IN STATE-OWNED CIPTA KARYA COMPANIES USING THE ALTMAN Z-SCORE, SPRINGATE, AND ZMIJEWSKI MODELS

PREDIKSI TINGKAT FINANCIAL DISTRESS PADA PERUSAHAAN CIPTA KARYA MILIK NEGARA DENGAN MENGGUNAKAN MODEL ALTMAN Z-SCORE, SPRINGATE, DAN ZMIJEWSKI

Ari Nur Wahidah[1], Muklis[2], Muhammad Fikri[3]
Faculty of Economics and Social Sciences, Sultan Syarif Kasim State Islamic University Riau[1,2,3,]
muklis@uin-suska.ac.id[1]

ABSTRACT

This research aims to assess the company's financial performance and analyze whether the company has the potential to experience financial distress as a precursor to bankruptcy. Predicting the level of financial distress will use the Altman Z-Score, Springate, and Zmijewski models, and look for a more accurate model among these three models. This research is descriptive quantitative in nature. The population of this research is the State-Owned/BUMN Cipta Karya company. The sampling technique in this research was purposive sampling, with several criteria. The sample for this research is the BUMN Cipta Karya company (heavy construction and civil engineering sub-sector) listed on the Indonesia Stock Exchange for the 2019-2022 period, totaling 5 companies. The results of this research show that the highest level of accuracy in predicting financial distress at State-Owned/BUMN Cipta Karya for the 2019-2022 period is Springate at 100%. Then Altman Z-Score and Zmijewski with the same level of accuracy, equal to 40%.
Keywords: *Financial Distress, Altman Z-Score, Springate, Zmijewski*

ABSTRAK

Penelitian ini bertujuan untuk menilai kinerja keuangan perusahaan dan menganalisis apakah perusahaan berpotensi mengalami financial distress sebagai prekursor kebangkrutan. Prediksi tingkat financial distress akan menggunakan model Altman Z-Score, Springate, dan Zmijewski, serta mencari model yang lebih akurat diantara ketiga model tersebut. Penelitian ini bersifat deskriptif kuantitatif. Populasi penelitian ini adalah perusahaan BUMN Cipta Karya. Teknik pengambilan sampel dalam penelitian ini adalah purposive sampling, dengan beberapa kriteria. Sampel penelitian ini adalah perusahaan BUMN Cipta Karya (sub sektor konstruksi berat dan teknik sipil) yang terdaftar di Bursa Efek Indonesia periode 2019-2022 yang berjumlah 5 perusahaan. Hasil dari penelitian ini menunjukkan bahwa tingkat akurasi tertinggi dalam memprediksi financial distress pada BUMN Cipta Karya periode 2019-2022 adalah Springate sebesar 100%. Kemudian Altman Z-Score dan Zmijewski dengan tingkat akurasi yang sama yaitu sebesar 40%.
Kata Kunci: Financial Distress, Altman Z-Score, Springate, Zmijewski.

INTRODUCTION

In recent years, infrastructure development in Indonesia has increased sharply. Since President Jokowi's leadership, many infrastructure projects have been built and utilized by the community. According to BPJT (Toll Road Regulatory Agency) data Prihapsari et al., (2023) on September 20 2023, the total number of toll roads currently operating in Indonesia is 68 toll road sections with a length of 2,545 km and 27 toll road sections under construction with a length of 1,813 km, as well as other infrastructure such as public roads Many buildings, buildings and bridges are already operational.

Companies involved in a country's infrastructure play an important and strategic role because they enable a clear evaluation of a country's development (Lam et al., 2021). This business entity operates in the fields of energy, transportation and communications (including toll roads, airports, ports and their components).

Since the *2019 Coronavirus Disease pandemic occurred*, many

negative impacts have occurred, quite a few companies have experienced *financial distress* because they were unable to meet the company's operational needs (PH et al., 2020). This happens because of the decline in people's usability or purchasing power so that company income decreases and some even experience losses (Setyaningrum et al., 2020). This can cause the company to potentially be in a condition of *financial distress* which could be the beginning of bankruptcy.

Several models for predicting *financial distress* have been developed by many experts, some of which are often used are the Altman Z-Score, Springate, and Zmijewski models. Each model has different ratios, Altman uses 4 financial ratios to predict *financial distress* after making modifications, Springate uses 4 financial ratios, and Zmijewski uses 3 financial ratios. Given the differences in the use of financial ratios between the three models, it does not rule out the possibility that there will be differences in predicted results. According to research conducted (Fadilah & Ratnasari, 2020) using a sample of 4 State –Owned/BUMN Karya companies for the 2015-2020 period. The research results show that the Springate model is the most accurate model with an accuracy of 100%, followed by the Zmijewski model with an accuracy rate of 20.9%, and then the Altman model with an accuracy rate of 16.6%.

According to research conducted (Purwanti, 2019), the highest level of accuracy is Springate at 91.66%, and the Altman model at 60.41%.

The results of research conducted by (Arif et al., 2019) show that the Zmijewski model is the model with the highest accuracy of 83.33%, followed by the Springate and Grover models with accuracy levels of 12.50% and 70.83% respectively.

Based on the background above, researchers are interested in conducting research regarding *financial distress analysis* of state-owned companies Cipta Karya (heavy construction and civil engineering sub-sector) listed on the Indonesia Stock Exchange for the 2019-2022 period. The aim of this research is to determine the financial performance of the BUMN Cipta Karya company and the potential for bankruptcy using the Altman Z-Score, Springate, and Zmijewski models. This research also aims to find out which model is the most accurate in predicting the level of *financial distress* in the state-owned/BUMN Cipta Karya company for the 2019-2022 period.

Literature Review

Financial Statements

According to Farid and Siswanto (2011) in Diana (2018) financial reports are information that is expected to provide assistance to users in making economic decisions of a financial nature. Imdieke and Smith (2000) in (Hayat et al., 2021) define financial reports as reports that consist of two parts, namely internal and external reports. Internal reports are reports prepared for company management. This report contains management accounting related to the company's production management this report is not available to external parties. Meanwhile, external reports are designed and prepared specifically for external parties such as creditors and shareholders as a tool for decision makers. In financial reports, you can see the big picture of a company's life cycle, including its current position, product sales and profit levels (Sukamulja, 2019). Financial reports published by the company are one source information about the financial position and

performance of the company which is very useful for supports the right decision making, because financial reports are a summary of company transactions and activities in one period, namely one year book(Kurniadi, 2021).

Financial Distress

Financial distress is a condition where *cash flow* a company's *operations* are not sufficient to meet current obligations such as (trade credit or bank loans with interest) and the company is forced to take corrective action. (Arifin, 2018.)According to Platt and Platt (2007) in Goh (2023), *financial distress* is a condition where a company's finances are unhealthy or are having financial problems, but can still operate and have not yet experienced bankruptcy. According Lukman (2022) to several factors causing the decline in company performance, namely internal factors and external factors. Internal factors are factors that originate from within the company, for example the use of technology that is not yet *modern,* large company debt, and management errors *(misconduct)*. Meanwhile, external factors are factors that come from outside the company and are outside the company's control, for example economic instability, changing industry *trend, and changes in consumer tastes.* According to Ratna & Marwati (2018), there are five indicators seen from external parties to identify signs of financial difficulties, namely: 1) Reducing the amount of shareholder dividends for several consecutive periods. 2) Profits continue to decline, and the company makes a loss. 3) Closing or sell one or more business units. 4) Lay off a large number of employees. 5) Market prices begin to fall continuously (Hidayat et al., 2023).

Bankruptcy

Bankruptcy is the result of unresolved financial problems. Purnajaya and Merkusiwati (2014:49) in (Supriati et al., 2019)defining bankruptcy is a condition when the company experiences insufficient funds forrunning his business. According to Sinaga et al., (2019) bankruptcy is a condition of a company in carrying out operations due to the inability of the funds it has(Handayani & Kawisana, 2023). According to Hutauruk, et al. if a company experiences bankruptcy, of course there are several parties who suffer losses, namely parties who have an interest in the company such as investors and creditors (Karim, 2023). Indicators that can be used to see signs of bankruptcy are as follows (Karim, 2023), 1) Decrease in the amount of dividends for several consecutive periods. 2) Continuous decline in profits and even the company experiencing losses. 3) Closing or selling one or more businesses, and 4) Massive layoffs (PHK).

Altman Z-Score Method

Altman (1968) introduced this method to predict and estimate company failure, known as the *"Z-Score Model"*. Quoted from (Hastuti, 2018)Altman, he formulated the Z-Score analysis model as follows:

Z -Score = 6.56 (X_1) + 3.26 (X_2)+ 6.72 (X_3)+ 1.05 (X_4)

Information:

Z = Bankruptcy Index

X_1= Working Capital / Total Assets

X_2= Retained Earnings / Total Assets

X_3= Earnings Before Interest and Taxes / Total Assets

X_4= Book Value of Equity / Book Value of Liabilities

The classification of company categories in the Altman Z-Score equation is as follows:

a. If Z > 2.6 indicates health

b. If 1.1 < Z < 2.6 Indicates a dark area (gray area)
c. If Z < 1.1 indicates bankruptcy

Springate models

Quoted from (Meiliawati & Isharijadi, 2017)the Springate method, it is a model developed by Springate (1978) using multidiscriminant analysis. Initially Springate used 19 ratios, but after testing Springate took four ratios. The Springate model equation is as follows (Fitriani & Huda, 2020):

$$\textbf{S-Score} = \textbf{1.03}(X_1) + \textbf{3.07}(X_2) + \textbf{0.66}(X_3) + \textbf{0.4}(X_4)$$

Where:

X_1 = *Working Capital/Total Assets* (Working Capital / Total Assets)

X_2 = *Earnings Before Interest and Tax/Total Assets* (Earnings Before Interest and Tax/Total Assets)

X_3 = *Earning Before Tax/Total Assets* (Profit Before Tax/Current Liabilities)

X_4 = *Sales/Total Assets* (Sales/Total Assets)

Each company will get a different score from this calculation. The Springate Score model divides companies into three assessment score categories.

a. An S value below 0.862 indicates a risk of bankruptcy
b. An S value above 1.062 indicates health.
c. Values of 0.826 and 1.062, the company is in the area between distress and non-distress

Zmijewski Model

Zmijewski (1984) uses probabilistic analysis, which involves more complex calculations than the logit model, to estimate financial distress (Kristanti, 2019). The following is the equation model that Zmijewski developed and successfully used:

$$\textbf{\textit{Zm}} = \textbf{-4.336} - \textbf{4.513}\,(X_1) + \textbf{5.679}(X_2) - \textbf{0.004}(X_3)$$

Information:

X_1 = *Net Income/Total Assets* (Net Profit/Total Assets)

X_2= *Total Liabilities/Total Assets* (Total Debt/Total Assets)

X_3 = *Current Ratio/Current Liabilities* (Current Assets/Current Liabilities)

The classification of company categories in the Zmijewski equation is as follows:

a. If the zm value >0 (positive) indicates that the company indicated *distress* (has the potential for bankruptcy)
b. If the zm value <0 (negative) indicates that the company indicated *non-distress* (the company is in good health)

RESEARCH METHOD

The type of data used in this research is quantitative descriptive. Descriptive research according to (Sugiyono, 2022)involves statements or explanations of data in their raw form without attempting to draw broad conclusions. The aim of this kind of descriptive research is to describe accurately and systematically the relationship between the facts, characteristics and phenomena being studied.

The population in this research is BUMN Cipta Karya companies listed on the Indonesia Stock Exchange (BEI). The sampling technique in this research is *purposive sampling,* with the following criteria: a) State-Owned Enterprises (BUMN), 2) Heavy construction and civil engineering sub-sector companies listed on the Indonesia Stock Exchange (BEI), 3) Companies that publish company financial reports on the Indonesian Stock Exchange in 2019-2022. So, the sample in this study was 5 state-owned companies in the heavy construction and civil engineering sub-sectors listed on the Indonesia Stock Exchange for the 2019-2022 period. The

techniques used to analyze *financial distress* in this research are *Altman Z-Score, Springate*, and *Zmiijewski*.

Accuracy Test and *Type of Error*

Accuracy testing is carried out to find out which model is better at estimating the company's financial situation. To compare the predictions of each model with true and false samples. Both the number of accurate predictions and the number of inaccurate predictions are determined by the results of the accuracy test calculations and their respective error rates (Widiasmara & Rahayu, 2019).

$$\text{Accuracy Level} = \frac{True\ Prediction}{Total\ Sampel} \text{x } 100\%$$

$$\textit{Type of Error} = \frac{False\ Prediction}{Total\ \boldsymbol{Sampel}} \text{x } 100\%$$

By using these results, we can determine that the model with the best level of accuracy for bankruptcy prediction is *the type of error* with the lowest error rate.

Comparative Test

Comparative analysis interprets and compares the results of quantitative analysis according to the theories that support the research. Comparative analysis uses *One Way* Anova (one-way anova test) and Duncan's Test. The one-way Anova test only determines whether there are differences between three or more data, while it cannot be concluded which groups are different. Duncan's test also known as Duncan's range test, is used to evaluate pairwise comparisons between multiple models means to determine which model produces the best results between *Altman Z-Score, Sringate,* and *Zmijewski* (Salim, 2016).

RESULTS AND DISCUSSIONS

Financial Distress Prediction using the *Altman Z-Score Model* The following are the results of *the Altman Z-Score model analysis calculations* for the BUMN Cipta Karya company for the 2019-2022 period:

Table 1. Calculation Results of *Altman Z-Score* Model *Financial Distress Analysis*

No	Stock Code	Period	X1	X2	X3	X4	Value	Prediction
1	ADHI	2019	1,033	0,048	0,230	0,242	1,553	*Grey Area*
		2020	0,520	-0,126	0,147	0,180	0,722	*Distress*
		2021	0,078	0,149	0,162	0,173	0,563	*Distress*
		2022	0,816	0,151	0,166	0,297	1,430	*Grey Area*
2	PTPP	2019	1,073	0,048	0,223	0,383	1,727	*Grey Area*
		2020	0,728	0,008	0,149	0,373	1,258	*Grey Area*
		2021	0,423	0,016	0,208	0,365	1,012	*Distress*
		2022	0,644	0,015	0,191	0,364	1,214	*Grey Area*
3	PPRE	2019	0,937	0,284	0,580	0,722	2,523	*Grey Area*
		2020	0,871	0,151	0,311	0,736	2,068	*Grey Area*
		2021	0,618	0,174	0,341	0,772	1,905	*Grey Area*
		2022	0,959	0,197	0,375	0,745	2,276	*Grey Area*
4	WSKT	2019	0,215	0,228	0,271	0,327	1,041	*Distress*
		2020	-0,975	-0,067	-0,317	0,196	-1,164	*Distress*
		2021	0,972	0,242	0,243	0,184	1,642	*Grey Area*
		2022	0,794	0,330	0,208	0,178	1,510	*Grey Area*
5	WIKA	2019	1,266	0,244	0,397	0,470	2,378	*Grey Area*
		2020	0,367	0,001	0,151	0,340	0,859	*Distress*
		2021	0,021	0,209	0,131	0,352	0,713	*Distress*
		2022	0,306	0,190	0,139	0,319	0,953	*Distress*

From the table above it can be seen that according to the Altman model in 2019 there was 1 company that was in a state of *distress*, namely WSKT. Meanwhile, other companies are in *the Gray Area condition* or are in the gray zone. In 2020, according to Altman's model, there were 3 companies experiencing *Distress conditions*, namely ADHI, WSKT, and WIKA. Meanwhile, the other 2 companies, namely PTPP and PPRE, are in the gray zone or *Gray Area.*

In 2021, according to Altman's model, there are 3 companies that are experiencing financial difficulties or *distress,* companies that are experiencing financial difficulties,

namely ADHI, PTPP, and WIKA. Meanwhile, companies in the gray *area* are PPRE and WSKT. In 2022, according to Altman's model, there will be one company experiencing financial difficulties or the potential for bankruptcy, namely WIKA. Meanwhile, ADHI, PTPP, PPRE and WSKT companies are in the gray zone or *Gray Area.*

Financial Distress Prediction using the *Springate Model*

The following are the results of the *Springate model analysis calculations* for the BUMN Cipta Karya company for the 2019-2022 period:

Table 2. Calculation Results of *Springate* Model *Financial Distress Analysis*

No	stock code	Period	X1	X2	X3	X4	Value	Prediction
1	ADHI	2019	0.162	0.105	0.018	0.168	0.454	*Distress*
		2020	0.082	0.067	0.001	0.114	0.264	*Distress*
		2021	0.012	0,074	0,002	0,116	0,204	*Distress*
		2022	0,128	0,076	0,005	0,136	0,345	*Distress*
2	PTPP	2019	0,168	0,102	0,024	0,168	0,462	*Distress*
		2020	0,114	0,068	0,007	0,118	0,308	*Distress*
		2021	0,066	0,095	0,008	0,121	0,290	*Distress*
		2022	0.101	0,087	0.009	0.131	0.329	*Distress*
3	PPRE	2019	0.147	0.265	0,087	0.199	0,698	*Distress*
		2020	0.137	0.142	0.027	0.136	0,442	*Distress*
		2021	0.097	0.156	0.029	0,160	0,442	*Distress*
		2022	0,151	0,171	0,034	0,192	0,547	*Distress*
4	WSKT	2019	0,034	0,124	0,019	0,102	0,280	*Distress*
		2020	-0,153	-0,145	-0,133	0,061	-0,370	*Distress*
		2021	0,153	0,111	-0,026	0,047	0,285	*Distress*
		2022	0,125	0,095	-0,038	0,062	0,244	*Distress*
5	WIKA	2019	0,199	0,182	0,061	0,175	0,616	*Distress*
		2020	0,058	0,069	0,005	0,097	0,228	*Distress*
		2021	0,003	0,060	0,004	0,103	0,169	*Distress*
		2022	0,048	0.063	0.003	0.114	0.229	*Distress*

Based on the table above, in 2019 the Springate model predicts that the BUMN Cipta Karya company will be in *the financial distress zone*, which is the beginning of bankruptcy. The company is in *the financial distress zone* because the *S-Score value* is below 0.862. This indicates that the company is experiencing serious financial problems and must be immediately evaluated by company management.

Based on the table above, in 2020 the Springate model predicts that the BUMN Cipta Karya company will be in *the financial distress zone*, which is the beginning of bankruptcy. The company is in *the financial distress zone* because the *S-Score value* is below 0.862. This indicates that the company is experiencing serious financial problems and must be immediately evaluated by company management.

Based on the table above, in 2021 the Springate model predicts that the BUMN Cipta Karya company will be in *the financial distress zone*, which is the beginning of bankruptcy. The company is in *the financial distress zone* because the *S-Score value* is below 0.862. This indicates that the company is experiencing serious financial problems and must be immediately evaluated by company management.

Based on the table above, in 2022, the Springate model predicts that the BUMN Cipta Karya company will be in the *financial distress zone*, which is the beginning of bankruptcy. The company is in *the financial distress zone* because the *S-Score value* is below 0.862. This indicates that the company is experiencing serious financial problems and must be immediately evaluated by company management.

Financial Distress Prediction using the *Zmijewski Model*

The following are the results of the *Zmijewski model analysis calculations* for the BUMN Cipta Karya company for the 2019-2022 period:

Table 3. Calculation Results of *the Zmijewski Financial Distress* Model Analysis

No	stock code	Period	X1	X2	X3	Value	Prediction
1	ADHI	2019	0.082	4,616	0.005	0.193	*Distress*
		2020	0.008	4,848	0.004	0.500	*Distress*
		2021	0.009	4,874	0.004	0.524	*Distress*
		2022	0.019	4,426	0.005	0.066	*Distress*
2	PTPP	2019	0.087	4,160	0.005	-0.268	*Non-Distress*
		2020	0.020	4,191	0.005	-0.169	*Non-Distress*
		2021	0.033	4,215	0.004	-0.159	*Non-Distress*
		2022	0.031	4,218	0.005	-0.154	*Non-Distress*
3	PPRE	2019	0.258	3,365	0,005	-1,235	*Non-Distress*
		2020	0,079	3,339	0,005	-1,082	*Non-Distress*
		2021	0,094	3,272	0,005	-1,163	*Non-Distress*
		2022	0,108	3,321	0,005	-1,128	*Non-Distress*
4	WSKT	2019	0,035	4,330	0,004	-0,046	*Non-Distress*
		2020	-0,402	4,787	0,003	0,851	*Distress*
		2021	-0,075	4,831	0,006	0,564	*Distress*
		2022	-0,079	4,855	0,006	0,592	*Distress*
5	WIKA	2019	0,184	3,922	0,006	-0,603	*Non-Distress*
		2020	0,020	4,290	0,004	-0,070	*NonDistress*
		2021	0.015	4,252	0.004	-0.103	*NonDistress*
		2022	0.001	4,356	0.004	0.014	*Distress*

From the table above, it can be seen that in 2019 there was one company that was in a state of *distress,* namely ADHI. Meanwhile, PTPP, PPRE, WSKT and WIKA companies are in a *on distress condition.* In 2020, there were two companies that were in a state *of distress*, namely ADHI and WSKT. Meanwhile, PTPP, PPRE and WIKA companies are in the *NonDistress category.*

In 2021, the ADHI and WSKT companies will be in a state of financial difficulty with the potential for bankruptcy. Meanwhile, the PTPP, PPRE and WIKA companies are in a *NonDistress condition*, which indicates that the companies have a healthy financial condition. ADHI, WSKT, and WIKA companies will be in financial difficulties in 2022. Meanwhile, PTPP and PPRE companies are in a healthy financial condition or *NonDistress.*

Accuracy Level Analysis

Accuracy testing is carried out to find out which model is better at estimating the company's financial situation. The following is the level of accuracy of each *financial distress prediction model:*

Tabel 4. Financial Distress Models

No	Analysis Model	Period	Analysis Results			Total	Level of accuracy	*Type Error*
			Distress	Gray Area	Non-Distress			
1	Altman	2019	1	4	-	5	100%	0%
		2020	3	2	-	5	100%	0%
		2021	3	2	-	5	100%	0%
		2022	1	4	-	5	100%	0%
2	Springate	2019	5	-	-	5	100%	0%
		2020	5	-	-	5	100%	0%
		2021	5	-	-	5	100%	0%
		2022	5	-	-	5	100%	0%
3	Zmijewski	2019	1	-	4	5	20%	80%
		2020	2	-	3	5	40%	60%
		2021	2	-	3	5	40%	60%
		2022	3	-	2	5	60%	40%

Comparative Test

Table 5. Anova test

ANOVA

Financial Distress

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9.779	2	4.890	11.985	.000
Within Groups	23.255	57	.408		
Total	33.034	59			

a significant difference between variables X1 *,* Furthermore, the calculated F value for X1, X2 and X3 is 11,985 > 3.15, exceeding the F table which shows that X1,

Table 6. Duncan test

Financial Distress

Duncan [a]

Model Financial Distress Prediction	N	Subset for alpha = 0.05	
		1	2
Zmijewski	20	-.14380	
Springate	20	.22820	
Altman	20		.83570
Sig.		.071	1,000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 20,000.

Based on the results of the Duncan test, there are real differences between variables X1 and X2, X1 and X3. Furthermore, there is no real difference between variables X1 and X2.

Discussion

Comparative Analysis of the Altman Model with the Springate Model

Based on the research that has been carried out, it can be seen that according to the Altman and Springate Model, all companies studied have the potential for bankruptcy. According to the Springate model, all companies are in financial difficulty, but according to the Altman model, there are still dark areas *that* occur in some periods. This indicates that in the research period there were still companies that had sufficient *financial resources, but had not yet reached the healthy category.*

Comparative Analysis of the Springate Model with the Zmijewski Model

Based on the research that has been carried out, it can be seen that the Springate model has the highest level of accuracy, this indicates that according to the Springate model there were no companies that were in the healthy category during this research period. Meanwhile, according to the Zmijewski model, it predicts that there are companies experiencing *financial distress* and *non-distress companies,* companies that are in a healthy condition.

CONCLUSION

Based on the tests that have been carried out, you can the conclusions drawn from this research are h:

1. There is the potential for bankruptcy of state-owned companies in the heavy construction and civil engineering sub-sectors listed on the Indonesian Stock Exchange from 2019 to 2022 with implemented *Altman Z-Score, Springate, and Zmijewski analysis.*
2. There are differences between the *Altman Z-Score, Springate, and Zmijewski models* in predicting company bankruptcy BUMN in the heavy construction and civil engineering sub-sector listed on the Indonesia Stock Exchange in 2019 to 2022.
3. Of the three bankruptcy analysis models in this research, the *Springate model* is the most accurate prediction model that can be applied to companies BUMN in the heavy construction and civil engineering sub-sectors listed on the Stock Exchange Indonesia from 2019 to 2022, because this model has the highest level of accuracy compared to other prediction models that is, 100%. Followed by *the Altman* and *Springate* models which have accuracy rate of 40%.
4. This research has the implication that it is important for companies and investors to improve their financial performance by minimizing their debt, especially by paying attention to the debt ratio and its risks.

Suggestion

The researcher's advice to capital market investors is the need to pay attention to the potential for bankruptcy that occurs based on the company's financial condition. This needs to be done to be able to mitigate the risk of loss in investing in the capital market. Apart from that, with the existence of a loss prediction model (Financial Distress), investors no longer only analyze the viability of a company using financial ratios that focus solely on profitability. Apart from that, with the limitations of

existing data, where researchers focus only on internal company variables, further research can add external variables such as government policy. Apart from that, another proxy that can be used is market-based company size for companies with which the results can be compared.

REFERENCES

Arif, M. F., Tinggi, S., Ekonomi, I., & Makassar, B. (2019). *P-issn : 2579-969x ; e-issn : 2622-7940 analisis perbandingan model pendeteksi financial distress*. 35–43.

Arifin, A. Z. (n.d.). *Manajemen Keuangan* (Issue september 2016).

Diana, S. R. (2018). *Analisis Laporan Keuangan dan Aplikasinya*. In Media.

Fadilah, A., & Ratnasari, I. (2020). Prediksi Tingkat Financial Distress Perusahaan BUMN Karya. *Jurnal Ekonomi, Bisnis, Dan Manajemen*, 15–23.

Fitriani, M., & Huda, N. (2020). Analisis Prediksi Financial Distress Dengan Metode Springate (S-Score) Pada Pt Garuda Indonesia Tbk. *Nominal: Barometer Riset Akuntansi Dan Manajemen*, *9*(1), 45–62. https://doi.org/10.21831/nominal.v9i1.30352

Goh, T. S. (2023). Monograf : Financial Distress. In *Indomedia Pustaka*.

Handayani, G., & Kawisana, P. G. W. P. (2023). Analisis Rasio Keuangan Untuk Memprediksi Kebangkrutan Dengan Model Altman Z-Score. *WACANA EKONOMI (Jurnal Ekonomi, Bisnis Dan Akuntansi)*, *22*(1), 86–90. https://doi.org/10.22225/we.22.1.2023.86-90

Hastuti, R. T. (2018). Analisis Komparasi Model Prediksi Financial Distress Altman, Springate, Grover Dan Ohlson Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia Periode 2011-2013. *Jurnal Ekonomi*, *20*(3), 446. https://doi.org/10.24912/je.v20i3.405

Hayat, A., Hamdani, & Azhar, I. (2021). *Manajemen Keuangan (Buku Satu)*.

Hidayat, T., Yahya, A., & Permatasari, M. D. (2023). PengaRuh Financial Distress, Inflasi, dan Nilai Tukar Terhadap Keputusan Investasi serta Implikasinya Pada Nilai Perusahaan. *Jurnal Akuntansi Bisnis Pelita Bangsa*, *8*(1), 1–14. https://www.journal.lppmpelitabangsa.id/index.php/akubis/article/view/744

Karim, A. (2023). *Analisis Kebangkrutan Perusahaan Makanan dan Minuman di Indonesia* (M. Yusri, Ed.). Nas Media Pustaka.

Kementrian PUPR. (2022). *Informasi Statistik Infrastruktur Dinas Pekerjaan Umum dan Penataan Ruang 2022*. *1*, 1–67.

Kristanti, F. T. (2019). *Financial Distress*. Inteligensia Media.

Kurniadi, A. (2021). Analisis Rasio Keuangan Untuk Memprediksi Financial Distress Perusahaan Manufaktur Di BEI. *Jurnal Ilmiah Manajemen Kesatuan*, *9*(3), 495–508. https://doi.org/10.37641/jimkes.v9i3.511

Lam, W. S., Lam, W. H., Jaaman, S. H., & Liew, K. F. (2021). Performance evaluation of construction companies using integrated entropy–fuzzy vikor model. *Entropy*, *23*(3), 1–16.

https://doi.org/10.3390/e23030320

Lukman, M. (2022). *Manajemen Keuangan Korporasi (Analisis Kebijakan Eksternal Perusahaan)*. Bintang Semesta Media.

Meiliawati, A., & Isharijadi, I. (2017). Analisis Perbandingan Model Springate Dan Altman Z Score Terhadap Potensi Financial Distress (Studi Kasus Pada Perusahaan Sektor Kosmetik Yang Terdaftar Di Bursa Efek Indonesia). *Assets: Jurnal Akuntansi Dan Pendidikan*, *5*(1), 15. https://doi.org/10.25273/jap.v5i1.1183

PH, L., Suwoso, R. H., Febrianto, T., Kushindarto, D., & Aziz, F. (2020). Dampak Pandemi Covid-19 bagi Perekonomian Masyarakat Desa. *Indonesian Journal of Nursing and Health Sciences*, *1*(1), 37–48. https://doi.org/10.37287/ijnhs.v1i1.225

Purwanti, E. (2019). Analisis Prediksi Kebangkrutan Dengan Model Altman Dan Springate Pada Bank Bumn Periode 2013 – 2015. *Among Makarti*, *12*(1), 94–107. https://doi.org/10.52353/ama.v12i1.178

Salim, M. N. (2016). Potensi Kebangkrutan Perusahaan Pertambangan Batu Bara Terdaftar di BEI dengan Pendekatan Model Altman, Springate dan Zmijewski Periode 2011-2014. *Jurnal Ekonomi*, *18*(3), 376–396.

Setyaningrum, K. D., Atahau, A. D. R., & Sakti, I. M. (2020). Analisis Z-Score Dalam Mengukur Kinerja Keuangan Untuk Memprediksi Kebangkrutan Perusahaan Manufaktur Pada Masa Pandemi Covid-19. *Jurnal Riset Akuntansi Politala*, *3*(2), 74–87. https://doi.org/10.34128/jra.v3i2.62

Sugiyono. (2022). *Metode Penelitian Kuantitatif, Kualitatif dan R & D* (2nd ed.). Alfabeta.

Sukamulja, S. (2019). *Analisis Laporan Keuangan: sebagai Dasar Pengambilan Keputusan Investasi (Edisi Revisi)* (Fauzia M.). Andi.

Supriati, D., Bawono, I. R., & Anam, K. C. (2019). Analisis Perbandingan Model Springate, Zmijewski, Dan Altman Dalam Memprediksi Financial Distress Pada Perusahaan Manufaktur Yang Terdaftar Di Bursa Efek Indonesia. *Journal of Applied Business Administration*, *3*(2), 258–270. https://doi.org/10.30871/jaba.v3i2.1730

Widiasmara, A., & Rahayu, H. C. (2019). Perbedaan Model Ohlson, Model Taffler Dan Model Springate Dalam Memprediksi Financial Distress. *Inventory: Jurnal Akuntansi*, *3*(2), 141. https://doi.org/10.25273/inventory.v3i2.5242