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Comparison Of The Accuracy Of Corporate Bankruptcy Prediction Models (Study On Listing And Delisting Companies In Indonesia Stock Exchange)

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Abstrak
This a company is bankruptcy prediction method is needed by various parties, such as investors, accountants, governments, lenders, and management in order to predict the continuity of a company's operations in the future. Various bankruptcy prediction studies have been conducted to determine the most precise and accurate bankruptcy prediction model in predicting bankruptcy. This study aims to examine which of the Altman model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model could significantly explain company bankruptcy and have the most accurate prediction accuracy. This research uses a descriptive quantitative approach. The sample is purposive sampling by taking 12 companies that were declared delisted from the Indonesia Stock Exchange in 2008-2022. The comparative sample is companies that are still listed on IDX with the same number and type, and randomly taken during the same period as the delisting company. The analysis technique in this research is binary logistic regression. The research results prove that of the six bankruptcy prediction models that can significantly explain company bankruptcy are the Zmijewski model, CA-Score model, and Ohlson model. However, the prediction model that has the most accurate level of prediction accuracy is the Zmijewski model. It is caused delisting companies that are the object of observation have a tendency of Earning After Taxes that obtained in a loss-profit or negative state and the amount of debt tends to be very large..

Keywords: *delisting, bankruptcy prediction model, altman model, zmijewski model, springate model, ca-score model, grover model, ohlson model.*

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INTRODUCTION

The ongoing global uncertainty has made the economic slowdown more widespread and experienced by most countries in the world. This economic condition is of course a threat to business actors from various sectors in Indonesia. If you are unable to survive in these difficult economic conditions, you will experience financial distress or you may even experience bankruptcy. Companies are expected not only to be able to adapt to current circumstances, but also to maintain the company's sustainability amidst changing conditions (Zu'amah, 2005).

Every company needs sufficient funding for its operational activities, one of the sources of funding is shares from investors. The capital market is used by companies as a medium for buying and selling shares to the public. In addition to securities trading places, the capital market

reflects the performance of a company. If a company's performance increases, the market will give a positive signal by indicating an increase in stock prices. However, it gives a negative signal if a company's performance decreases which in turn makes its share price also fall (Fatmawati, 2012). Bankruptcy of a company in the capital market can be known from the delisting conducted by the Indonesian Stock Exchange. Delisting is delisting or removing a company from the list of companies whose shares are listed as trading on the Indonesian Stock Exchange. Delisting can be done at the request of the company or what is commonly referred to as voluntary delisting. Delisting is also carried out by the Indonesia Stock Exchange because the company is unable to fulfill it's obligations and follow the rules that have been set (Hadi & Anggraeni, 2008).

It can be seen that from 2008 to 2022 the Indonesia Stock Exchange has delisted 62 companies from various sectors and 40 of them were delisted because the companies had been declared going concern or bankrupt. The rest of the companies were delisted for reasons of going private, mergers & acquisitions. Companies that are assumed to experience going concern are of course because these companies are experiencing problems with sustainable prospects in the future. The prospect of business continuity can be projected through financial performance.

Based on research conducted by (Elviani et al., 2020) regarding the comparison of bankruptcy prediction models for companies listed on the Indonesia Stock Exchange using the Altman model, Ohlson model, Springate model, and Zmijewski model. The results of the study state that the Springate model predicts corporate bankruptcy better than other prediction models. Based on research conducted by (Aminian et al., 2016) regarding the comparison of company bankruptcy prediction models for textile companies listed on the Tehran Stock Exchange using the Altman model, the Springate model, and the Zmijewski model, and the Grover model. Stating that the Grover model predicts the best company bankruptcy. (Sinarti & Sembiring, 2015), (Purnajaya & Merkusiwati, 2014), (Putri, 2019), And(Sunaryo Putri, 2018) in his research on comparative bankruptcy prediction models, he stated that the best bankruptcy prediction model was the Altman Z-score model.

Based on previous research conducted by (Husein & Pambekti, 2015)regarding the comparison of the bankruptcy prediction model for delisting companies listed on the Indonesia Stock Exchange using the Altman Z-Score and Zmijewski models, states that the Zmijewski model predicts bankruptcy of companies better. (Elviani et al., 2020) in his research on the most appropriate and accurate bankruptcy prediction model for predicting the bankruptcy of a company in the trading sector listed on the Indonesia Stock Exchange shows that an accurate model for use in predicting bankruptcy in the trading sector listed on the Indonesia Stock Exchange is the Springate model.

From previous studies, it can be shown that there are conflicts or differences in the best bankruptcy prediction models from each of the previous researchers. Therefore, researchers want to test the six best bankruptcy prediction models from each of the previous studies according to table 1.1, namely the Altman model, Springate model, Zmijewski model, CA-Score model, Grover model, and Ohlson model. Based on the results of the explanation above, the researcher wants to conduct further and more in-depth research on the method of predicting bankruptcy for a company. This study uses a sample of companies that are delisted due to financial reasons or do not have going concerns, companies that are in a state of insolvency, and do not include companies that have merged and acquired. (Ayu Damayanti et al., 2011), (Elviani et al., 2020), (Sinarti & Sembiring, 2015). Therefore the objects in this study are companies that were declared delisted from the IDX and did not have a going concern on IDX trading from 2008

to 2022. As a comparison, companies that listed the same amount on the Indonesian Stock Exchange traded from 2008-2022 with the criteria for comparison companies being companies from similar sectors.

LITERATURE REVIEW

Bankruptcy

According to Prihadi (2010) bankruptcy is a condition in which a company experiences difficulty in paying off its obligations. A company that goes bankrupt does not occur suddenly but appears to experience early symptoms that can be analyzed or seen from the financial statements using the calculation method. The method that can be used to identify the bankruptcy of a company is by using financial ratios.

Before bankruptcy occurs, the company will experience signs that indicate the company will go bankrupt. According to Teng (2002) the most obvious signs of bankruptcy include:

a. Negative/decreasing profitability.
b. The decline in market position.
c. Poor/negative cash position/inability to pay off cash obligations.
d. Sales decline
e. Decrease in sales value
f. Dependence on debt
g. Losses caused by operations.

Jauch and Glueck (1995) explained several factors that led to company bankruptcy, namely, general factors, company external factors, and company internal factors.

Altman Z-Score Model

Altman (1968) in predicting bankruptcy using the Multiple Discriminant Analysis (MDA) technique. The MDA technique is used for situations where two groups are identified as examples of the dependent variable that are bankrupt or not bankrupt.

The model developed by Altman was previously revised by eliminating the X5 variable (sales/total assets) because this ratio varies greatly in industries with different asset sizes. So the following Z-score model equation is modified by Altman et.al (1995) so that it can be used in all types of companies. Modified Z-Score equation (Altman et al, 1995):

$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$

Where:

Z'' = Altman Z'' Score
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 debt

The classification of healthy companies and bankrupt companies is based on the Altman Z-Score (1995), namely:

If the Z value < 1.1 then the company is in a state of bankruptcy.
If the value is 1.1 < Z < 2.6 then the company is in a gray area (it cannot be determined whether the company is healthy or bankrupt).
If the Z value > 2.6 then the company is in a healthy condition.

Based on research on bankruptcy prediction models conducted by (Sinarti & Sembiring, 2015) of 11 metal and manufacturing companies listed on the Indonesia Stock Exchange using 4 prediction models, namely Altman Z-Score, Springate S-score, and Zmijewski. The results of research that has been carried out using the Altman Z-Score model show that the average company has the potential to go bankrupt. (Putri, 2019) conducted research on the best predictive model using 5 bankruptcy prediction models, namely the Altman model, Springate model, Grover model, Ohlson model, and Zmijewski model for 3 banking companies that are still listed. The results of this study show that the Altman Z-Score model is the best model because it can predict the company is still in a healthy condition. Based on the description of the research above, the following hypotheses can be made:

H1 :*The Altman Z-Score model can significantly explain company bankruptcy.*

Zmijewski Model

Zmijewski (1984) is a prediction model using the ratio of performance, solvency, and liquidity of a company. The models that were successfully developed by Zmijewski are:

$X = -4.3 – 4.5X_1 + 5.7X_2 - 0.004X_3$

Where:

X = bankruptcy index

X_1 = ROA (return on assets)

X_2 = Leverage (debt to total assets ratio)

X_3 = Liquidity (current ratio)

The greater the value of the Zmijewski model, the more likely the company is to experience bankruptcy, in this model the cut-off used is 0 where if the value of X is positive then the company has the potential to experience bankruptcy, and if the value of X is increasingly negative then the company is declared in good health.

According to research conducted by (Husein & Pambekti, 2015)stated about the best bankruptcy prediction model using four bankruptcy prediction models, namely the Altman Z-Score model, the Springate model, the Zmijewski model, and the Grover model for 132 companies listed on the Islamic Stock Exchange in 2009-2012. This study shows the results that the Zmijewski model is the most accurate model to be used as a predictor of financial distress because it has the highest level of significance among the other models. Based on the description of the research above, the following hypotheses can be made:

H2 : The Zmijewski model can significantly explain company bankruptcy.

Springate S-Score Model

Gordon LV Springate (1978) developed a bankruptcy prediction model for a company by following the Altman model procedure. The four ratios that were successfully developed by Springate are formulated as follows:

$S = 1.3X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4$

Where:

S = bankruptcy index

X_1 = Working Capital /Total Assets

X_2 = Earnings Before Interest and Taxes/Total Assets

X_3 = Earnings Before Taxes /Current Liabilities

X_4 = Total Sales /Total Assets

Where:
S = bankruptcy index
X_1 = Working Capital /Total Assets
X_2 = Earnings Before Interest and Taxes/Total Assets
X_3 = Earnings Before Taxes /Current Liabilities
X_4 = Total Sales /Total Assets
The S grades compared to the grading standards are as follows:

a. S > 0.862, the company is included in the healthy category
b. S = 0.86, the company is in a gray area (it cannot be determined whether the company is healthy or bankrupt).
c. S < 0.862, the company is included in the bankruptcy category.

According to research conducted by (Putera et al., 2016)states a bankruptcy prediction model using three bankruptcy prediction models, namely the Altman model, the Springate model, and the Ohlson model for 7 companies selected based on predetermined criteria. The results of this study indicate that the Springate model has better accuracy than the Altman model and the Ohlson model. Likewise with research conducted by Elviani, et al., (2020) in their research on the most appropriate and accurate bankruptcy prediction model for predicting the bankruptcy of a company in the trading sector listed on the Indonesia Stock Exchange, shows that the right model to use in predicting bankruptcy in the trading sector in Indonesia is the Springate model. Based on the research description above:
H3: The Springate S-Score model can significantly explain company bankruptcy.

CA-Score Model

The CA-Score is a bankruptcy prediction model developed by the leadership of Jean Legault University of Quebec in Montreal using a multivariate analysis method for 30 different financial ratios. The CA-Score model is formulated as follows:
CA-Score = 4.5913 X_1 + 4.508 X_2 + 0.3936 X_3 – 2.7616
Where:
CA-Score = bankruptcy index
X_1 = shareholder investment (1) / total assets (1)
X_2 = EBT + financial expenses (1)/total assets (1)
X_3 = Sales (2) /total assets (2)
(1) = Overview of the previous period.
(2) = Overview of the previous two periods.

CA-Score assessment categories can be known as follows:

a. CA-Score > -0.3, the company is included in the healthy category.
b. CA-Score < -0.3, then the company is included in the bankruptcy category.

Riyana Sari, et.all (2019) conducted research on the company's bankruptcy prediction model using three bankruptcy prediction models, namely the Altman model, the Zmijewski model, and the CA-Score model for 52 manufacturing companies listed on the Indonesia Stock Exchange in 2012-2017. The results of this study indicate that the level of accuracy of each model is different each year based on company performance. The CA-Score prediction model is the best predictive model among the Altman and Smijewski models with an accuracy rate of 66.67%. Based on the description of the research above, the following hypotheses can be made:

H4 : The CA-Score model can significantly explain company bankruptcy.

Grover Model

Jeffrey S. (2001) developed a bankruptcy prediction model by re-development of the Altman Z-Score prediction model. The Grover model is formulated as follows:

G-Score = $1.650\ X_1 + 3.404\ X_2 - 0.016\ X_3 + 0.057$

Where:

G-Score = bankruptcy index

X_1 = working capital/total assets

X_2 = EBIT/total assets

X_3 = Net income/total assets

In predicting calculations using the Grover model, the company will be included in the bankrupt category if the calculated score is ($Z \leq -0.02$). The company is declared to be in the healthy category if the score is calculated ($Z \geq 0.01$).

Based on research conducted by Abolfazl Aminian, et.all., (2016) regarding the company bankruptcy prediction model using four bankruptcy prediction models, namely the Altman model, the Springate model, the Zmijewski model, and the Grover model for 35 companies from the textile and ceramics sector. The results show that the Grover model has a better ability to predict corporate bankruptcy. Based on the description of the research above, the following hypotheses can be made:

H5 : Grover model can significantly explain company bankruptcy.

Ohlson Model

Ohlson (1980) conducted a study based on inspiration from previous research and modified his study. The model developed by Ohlson has nine variables consisting of several financial ratios. The Ohlson model is formulated as follows:

O-Score = $-1.32 - 0.407X_1 + 6.03X_2 - 1.43X_3 + 0.0757X_4 - 2.35X_5 - 1.83X_6 + 0.285X_7 - 1.72X_8 - 0.521X_9$

Where:

O-Score = Bankruptcy Index

X_1 = log (total assets/GNP process-level index)

X_2 = total liabilities/total assets

X_3 = working capital/total assets

X_4 = current liabilities/current assets

X_5 = 1 if total liabilities>total assets; 0 if others wise

X_6 = net income/total assets
X_7 = cash flow from operations/total liabilities
X_8 = 1 if net income is negative; 0 if otherwise
X_9 = Size of change in net income
In predicting calculations using the Ohlson model, the company will be included in the bankrupt category if the calculated score (Z> 0.38). The company is declared to be in the healthy category if the score is calculated (Z < 0.38).
Based on research conducted by Bethani Suryawardani (2015) on the company bankruptcy prediction model using three company bankruptcy prediction models, namely the Altman model, Ohlson model, and the Zmijewski model for companies in the textile industry sector listed on the Indonesia Stock Exchange in 2008-2012 . The results showed that the Ohlson model has an accuracy rate of 97.8% compared to the Altman model and the Zmijewski model with an accuracy rate of only 73.3% and 60% respectively. Based on the description of the research above, the following hypotheses can be made:
H6 : Ohlson model can significantly explain company bankruptcy

Conceptual Models

explains the flow of research thinking patterns and explains how independent variables influence the dependent variable in accordance with various existing theories (Sugiyono, 2017). The following research framework has been modified by referring to previous research by Dyah Puspita (2018).

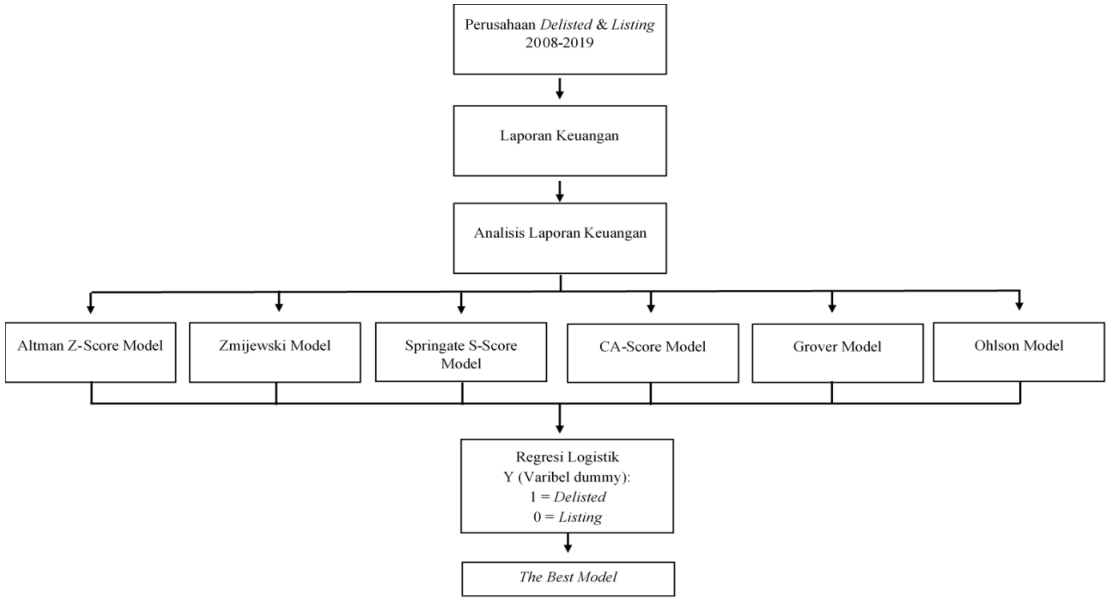

Figure 1: The Conceptual Model

METHOD, DATA, AND ANALYSIS

Location and Research Design

The location of this research was conducted in Makassar, Indonesia. The form of research conducted is a form of descriptive research with a quantitative approach, using electronic research methods and library research on the Indonesian Stock Exchange website and the

official website of the companies selected as samples to obtain data in the form of issuer's financial reports.

Population or Samples

The population in this study were all delisted companies listed on the Indonesia Stock Exchange for the 2008-2022 period, totaling 62 companies. The sample selection used a purposive sampling technique from companies that were delisted with certain conditions or considerations.

The sample criteria for delisting companies that have been determined by researchers are as follows:

1. Company delisted from the Indonesia Stock Exchange for the 2008-2022 period.
2. The company does not have business continuity (going concern).
3. Does not include companies delisted due to mergers, acquisitions and going private.
4. Published the company's complete and audited financial statements for the last three years, to be precise, the book closing date of December 31.

Based on the criteria set out above, a sample of 12 companies was obtained, namely:

1. BASS – Bahtera Adimina Samudra, Tbk
2. DSUC – Superior Power of Magic Corporindo, Tbk
3. PTRA – New Century Development, Tbk
4. RINA – Katarina Utama, Tbk
5. SIMM – Surya Intrindo Makmur, Tbk
6. CPDW – Indo Setu Bara Resources, Tbk
7. SAIP – Surabaya Agung Industrial Pulp and Paper, Tbk
8. ASIA – Asia Natural Resources, Tbk
9. SIAP – Sekawan Intipratama, Tbk
10. ATPK – Bara Jaya Internasional, Tbk
11. GMCW – Grahamas Citrawisata, Tbk
12. TMPI – Sigmagold Inti Perkasa, Tbk

The sample criteria for listing companies that have been determined by this researcher as comparison companies are as follows:

1. Companies listed on the IDX during the observation period (2008-222)
2. Companies from the same sector as the delisted companies that have been set as a sample.
3. The company publishes complete and audited financial statements for the last three years in accordance with the comparison delisting companies, to be precise, the book closing date of December 31.

Based on the criteria set out above, a sample of 12 companies was obtained, namely:

1. DSFI – Dharma Samudera Fishing Industries, Tbk
2. BIPP – Bhuwanatala Indah Permai, Tbk
3. COWL – Cowell Development, Tbk
4. CENT – Centrin Online, Tbk
5. ERTX – ERA TEX DJAJA, Tbk
6. KKGI – Natural Resources Indonesia, Tbk
7. SPMA – Suparma, Tbk
8. INTD – Inter Delta, Tbk
9. CTTH – Citatah, Tbk

10. SMMT – Golden Eagle Energy, Tbk
11. PGLI – Graha Lestari Indah Development, Tbk
12. DWGL – Dwi Guna Laksana, Tbk

Data Collection Method

Data collection techniques used in this study using documentation techniques. (Sugiyono, 2013)explained that documentation techniques are techniques used to obtain data and information through documents such as financial reports, journals, books, and so on which will later be processed further as research material. Documentation materials used can be in the form of electronic documents or printed documents.

Operational Variables

The independent variable used in this study is the score of each bankruptcy prediction model, namely the Altman model, the Zmijewski model, the Springate model, the Grover model, the CA-Score model, and the Ohlson model.

Table-1 : Companies Bankruptcy Prediction Model

No	Model	Rumus	Deskripsi	*Score Category*
1	Atlman Z" Score (1995)	**$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$**	Z'' = *bankruptcy index* X_1 = *working capital/total asset* X_2 = *retained earnings/total asset* X_3 = *earnings before interest and taxes/total asset* X_4 = *book value of equity/book value of debt*	$Z < 1.1$, Bangkrut $1.1 < Z < 2.6$, *Grey Area* $Z > 2.6$, Tidak Bangkrut
2	Zmijewski (1984)	**$X = -4.3 - 4.5X_1 + 5.7X_2 - 0.004X_3$**	X = *bankruptcy index* X_1 = ROA *(return on assets)* X_2 = *Leverage (debt ratio)* X_3 = *Likuiditas (current ratio)* .	$X \geq 0$, Bangkrut $X \leq 0$, Tidak Bangkrut

No	Model	Rumus	Deskripsi	*Score Category*
3	Springate (1978)	**$S = 1.3X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4$**	S = *bankruptcy index* X_1 = *working capital /total assets* X_2 = *EBIT/total assets* X_3 = *EBT /current liabilities* X_4 = *total sales /total assets*	S < 0.86, Bangkrut S = 0.86, *Grey Area* S > 0.86, Tidak Bangkrut
4	CA-Score (1987)	**$CA\text{-}Score = 4.5913\ X_1 + 4.508\ X_2 + 0.3936\ X_3 - 2.7616$**	CA-Score = *bankruptcy index* X_1 = *shareholder investment (1) /total asset (1)* X_2 = EBT + *financial expenses (1)/total asset (1)* X_3 = *Sales (2) /total assets (2)* (1) = Gambaran satu periode sebelumnya. (2) = Gambaran dua periode sebelumnya.	CA-Score < -0.3, Bangkrut CA-Score > -0.3, Tidak Bangkrut
5	Grover (2001)	**$G = 1.650\ X_1 + 3.404\ X_2 - 0.016ROA + 0.057$**	G = *Bankruptcy index* X_1 = *Working capital/total assets* X_2 = *EBIT/Total assets* ROA = *Net income/total assets*	G ≤ -0.02, Bangkrut G ≥ 0.01, Tidak Bangkrut
6	Ohlson (1980)	**$O\text{-}Score = -1.32 - 0.407X_1 + 6.03X_2 - 1.43X_3 + 0.0757 - 2.35X_5 - 1.83ROA + 0.285X_7 - 1.72X_8 - 0.521X_9$**	O-score = *Bankruptcy Index* X_1 = *Log (Total Assets/GNP proce-level index)* X_2 = *Total Liabilities/Total Assets* X_3 = *Working Capital/Total Assets* X_4 = *Current Liabilities/Current Assets* X_5 = *1 if total libilities>total assets; 0 if otherswise* ROA = *Net Income/Total Assets* X_6 = *Cash flow from operations/Total Liabilities* X_7 = *1 if Net Income is negative; 0 if otherwise* X_8 = Ukuran perubahan laba bersih	O-Score > 0.38, Bangkrut O-Score < 0.38, Tidak Bangkrut

Source: Processed data, 2023.

While the dependent variable in this study is bankruptcy which is presented in the form of a dummy variable with a binomial size, namely 1 for companies declared bankrupt delisted and 0 for companies declared healthy listed on the Indonesia Stock Exchange.

Data Analysis Method

This study uses quantitative analysis techniques to analyze problems that are manifested by data. Quantitative analysis with dummy dependent variable processed using IBM SPSS (Statistical Package for the Social Sciences) Version 25 software and Microsoft Excel program. The analytical method used by researchers in this study is logistic regression analysis. According to (Ghozali, 2009). Using logistic regression analysis (logistic regression) to analyze quantitative data that reflects two choices or commonly called binary logistic regression. The reason for choosing this method is because the data used in this

study are non-metric in nature on the dependent variable, which consists of 2 categories denoted by y = 1 (bankrupt company) and y = 0 (non-bankrupt company) (Ghozali, 2011). According to (Ghozali, 2009) the assumption of normality on the independent variables in the regression method is not needed because the explanatory variable does not have to have a normal distribution, be linear, or have the same variance in each group. In logistic regression analysis also ignores the problem of heteroscedasticity because the dependent variable does not require homoscedasticity for each of its independent variables, so that in the analysis stage it only explains descriptive statistics and hypothesis testing (Gujarati, 2003).

This study uses logistic regression analysis by looking at the effect of each bankruptcy prediction model, namely Altman Z-Score model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model on the bankruptcy of companies listed on the IDX in 2008-2022.

The following is the equation model used for this study:

$$\textbf{Regression Logistic Model, } Yi = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + e$$

Where:

Yi = dummy variable, 1 =delisted and 0 = listings
α = Constant
β = Regression coefficient
X1 = Altman Z-Scores
X2 = Zmijewski score
X3 = Springate S-score
X4 = CA-score
X5 = Grover score
X6 = Ohlson score
e = Error rate (error)

RESULT AND DISCUSSION

Descriptive Statistics

Descriptive statistics provide an overview of the independent variables in the form of predictive models used, namely the Altman Z-Score model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model for companies that were delisted on the IDX in 2008-2022. In this study, a total of 72 observational data were obtained from the multiplication between the study period (3 years before the company was declared delisted) with the number of samples, namely 24 companies which were used as material for descriptions or descriptions related to variable statistical data, namely minimum, maximum, standard deviation, and mean which can be explained as follows:

Table-2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Altman	72	-62.17	17.92	-3.3789	11.00592
Zmijewski	72	-4.51	13.48	0.2492	3.75448
Springate	72	-2.76	3.8	0.1118	1.12722
CA-Score	72	-1.65	76.38	0.5138	11.41045
Grover	72	-4.05	3.08	-0.0161	1.22545
Ohlson	72	-2.07	38.46	3.2218	6.79482
Valid N (listwise)	72				

	N	Minimum	Maximum	Mean	Std. Deviation
Altman	72	-62.17	17.92	-3.3789	11.00592
Zmijewski	72	-4.51	13.48	0.2492	3.75448
Springate	72	-2.76	3.8	0.1118	1.12722
CA-Score	72	-1.65	76.38	0.5138	11.41045
Grover	72	-4.05	3.08	-0.0161	1.22545
Ohlson	72	-2.07	38.46	3.2218	6.79482
Valid N (listwise)	72				

Source: Processed data, 2023.

The results of the descriptive statistics according to table 4.2 show that the minimum value of the Altman model is -62.17 and the maximum value is 17.92. While the mean value is -3.3789 and the standard deviation value is 11.00592. The minimum value of the Zmijewski model is -4.5 and the maximum value is 13.48. While the mean value is 0.2492 and the standard deviation value is 3.75448. The minimum value for the Springate model is -2.76 and the maximum value is 3.8. While the mean value is 0.1118 and the standard deviation value is 1.12722. The minimum value of the CA-Score model is -1.65 and the maximum value is 76.38. While the mean value is 0.5138 and the standard deviation value is 11.41045. The minimum value for the Grover model is -4.05 and the maximum value is 3.08. While the mean value is -0. 0161 and the standard deviation value is 1.22545. The minimum value of the Ohlson model is -2.07 and the maximum value is 38.46. While the mean value is 3.2218 and the standard deviation value is 6.79482.

DISCUSSION

The results of the bankruptcy prediction of each model for 12 delisted companies and 12 companies that are still listed on the Indonesia Stock Exchange as a comparison company, so that the total companies used as samples to measure the accuracy of the predictions of the company's bankruptcy prediction model are 24 companies. The following is the predicted data from each model which is categorized into bankrupt (B), non-bankrupt (NB), and gray area (GA) in tables-3

Table-3: The Calculation Result of Bankruptcy Prediction Models (Delisting)

Delisting firm code	Period	Altman		Zmijewski		Springate		CA-Score		Grover		Ohlson	
		Score	Prediction	Score	Prediction	Score	Prediction	Score	Prediction	Score	Prediction	Score	Prediction
BASS	one year before	-8.786	B	2.854	B	-1.241	B	-0.157	NB	-1.560	B	21.855	B
	two years before	-5.695	B	1.099	B	-1.118	B	-0.733	B	-1.325	B	5.711	B
	three yaers before	-1.787	B	0.001	B	-0.355	B	-0.140	NB	-0.693	B	1.705	B
DSUC	one year before	-11.334	B	6.234	B	-1.085	B	-1.338	B	-2.107	B	6.761	B
	two years before	-5.870	B	3.510	B	-0.336	B	-1.400	B	-1.021	B	3.230	B
	three yaers before	-3.460	B	1.648	B	0.012	B	-1.326	B	-0.592	B	4.128	B
PTRA	one year before	-62.168	B	5.338	B	-0.704	B	76.101	NB	-0.891	B	5.065	B
	two years before	-13.461	B	-0.692	NB	0.381	B	22.069	NB	0.667	NB	3.015	B
	three yaers before	-13.523	B	-0.641	NB	0.367	B	22.132	NB	0.658	NB	0.349	NB
RINA	one year before	-0.770	B	-2.947	NB	0.747	B	13.927	NB	1.259	NB	-1.332	NB
	two years before	-2.600	B	10.040	B	-2.581	B	12.686	NB	0.276	NB	2.621	B
	three yaers before	17.918	NB	-3.952	NB	0.663	B	3.648	NB	0.921	NB	-0.923	NB
SIMM	one year before	-27.608	B	9.201	B	-2.759	B	7.920	NB	-4.045	B	17.407	B
	two years before	-26.152	B	9.478	B	-2.619	B	7.910	NB	-3.806	B	38.459	B
	three yaers before	-17.681	B	4.622	B	-1.922	B	5.020	NB	-2.785	B	32.166	B
CPDW	one year before	-7.282	B	-0.053	NB	0.639	B	9.737	NB	0.603	NB	5.251	B
	two years before	-13.679	B	3.093	NB	-1.627	B	11.368	NB	-1.491	B	4.167	B
	three yaers before	-2.123	B	0.763	B	-0.082	B	1.788	NB	0.045	NB	3.187	B
SAIP	one year before	-2.309	B	-1.922	B	-0.145	B	5.636	NB	-0.122	B	1.757	B
	two years before	-0.897	B	-3.141	B	0.082	B	5.366	NB	0.013	NB	-0.753	NB
	three yaers before	-4.230	B	3.805	B	-0.086	B	4.762	NB	-0.097	B	4.033	B
ASIA	one year before	-18.302	B	-2.427	NB	0.609	B	31.831	NB	0.516	NB	-0.454	NB
	two years before	-18.535	B	-2.029	NB	0.041	B	31.826	NB	0.285	NB	-0.647	NB
	three yaers before	-16.464	B	-2.062	B	-0.538	B	28.197	NB	-0.226	B	-0.781	NB
SIAP	one year before	-3.722	B	2.320	B	-0.485	B	45.974	B	-0.544	B	2.970	B
	two years before	-2.976	B	1.896	B	-0.382	B	45.771	B	-0.407	B	2.309	B
	three yaers before	-2.486	B	1.921	B	-0.337	B	45.752	B	-0.338	B	1.713	B
ATPK	one year before	-5.649	B	0.334	B	-0.738	B	0.458	NB	-0.766	B	2.421	B
	two years before	-4.366	B	0.532	B	-0.798	B	-0.482	B	-0.702	B	2.011	B
	three yaers before	-1.780	B	-0.435	NB	-0.710	B	-1.259	B	-0.624	B	0.660	B
GMCW	one year before	-1.677	B	0.527	B	1.416	NB	3.426	NB	1.230	NB	2.930	B
	two years before	-1.335	B	0.379	B	1.376	NB	3.048	NB	1.189	NB	3.132	B
	three yaers before	-1.370	B	0.515	B	1.253	NB	2.737	NB	1.159	NB	3.288	B
TMPI	one year before	-0.730	B	-0.776	NB	-0.410	B	2.803	NB	-0.298	B	-0.101	NB
	two years before	5.941	NB	-3.429	NB	0.101	NB	1.687	NB	0.172	NB	0.279	B
	three yaers before	6.120	NB	-3.279	NB	0.095	NB	1.648	NB	0.204	NB	-2.068	NB

Source: Processed data, 2023.

Table-4: The Calculation Result of Bankruptcy Prediction Model (Listing)

Listing firm code	Period	Altman		Zmijewski		Springate		CA-Score		Grover		Ohlson	
		Score	Prediction	Score	Prediction	Score	Prediction	Score	Prediction	Score	Prediction	Score	Prediction
DSFI	one year before	3.342	NB	-2.017	NB	0.710	B	0.286	NB	0.619	NB	1.528	B
	two years before	-1.343	B	-0.120	NB	-0.576	B	-1.048	B	-0.785	B	0.777	B
	three yaers before	2.707	NB	-1.561	NB	0.854	B	-0.698	B	0.488	NB	2.111	B
BIPP	one year before	-11.451	B	-0.848	NB	-0.356	B	14.553	NB	-0.435	B	0.972	B
	two years before	-7.112	B	-1.926	NB	-0.058	B	10.931	NB	-0.118	B	0.476	B
	three yaers before	-6.109	B	-1.279	NB	-0.080	B	10.000	NB	0.011	NB	-0.054	NB
COWL	one year before	4.039	NB	-1.536	NB	0.661	NB	-1.166	B	0.755	NB	1.769	B
	two years before	6.849	NB	-2.516	NB	1.140	NB	-0.741	B	1.323	NB	0.248	NB
	three yaers before	4.983	NB	-2.018	NB	0.783	B	-0.867	B	0.914	NB	1.082	B
CENT	one year before	10.728	NB	-3.574	NB	0.804	B	-0.181	B	0.958	NB	-0.543	NB
	two years before	1.749	NB	-0.236	NB	0.234	B	-1.662	B	0.314	NB	3.468	B
	three yaers before	9.799	NB	-4.009	NB	0.738	B	0.326	NB	0.737	NB	1.787	B
ERTX	one year before	-3.720	B	2.422	B	0.913	NB	0.994	NB	0.034	NB	3.451	B
	two years before	-16.314	B	13.475	B	-1.618	B	-1.144	B	-2.760	B	13.862	B
	three yaers before	-14.366	B	11.735	B	-0.890	B	-0.569	B	-2.221	B	12.791	B
KKGI	one year before	11.757	NB	-4.513	NB	3.800	NB	3.858	NB	3.084	NB	-0.514	B
	two years before	8.890	NB	-3.344	NB	2.858	NB	0.834	NB	2.307	NB	0.182	NB
	three yaers before	6.446	NB	-2.287	NB	1.666	NB	0.238	B	1.337	NB	1.042	B
SPMA	one year before	3.109	NB	-1.388	NB	0.809	B	-0.803	B	0.682	NB	1.629	B
	two years before	2.119	GA	-1.461	NB	0.612	B	-0.686	B	0.397	NB	1.817	B
	three yaers before	2.891	NB	-1.453	NB	0.757	B	-0.568	B	0.598	NB	-0.762	NB
INTD	one year before	2.864	NB	-1.489	NB	1.787	NB	3.167	B	1.349	NB	1.816	B
	two years before	1.880	GA	-0.978	NB	1.639	NB	3.124	B	1.200	NB	2.595	B
	three yaers before	1.268	GA	-0.630	NB	1.739	NB	2.868	B	1.209	NB	2.689	B
CTTH	one year before	1.190	GA	-1.177	NB	0.592	B	0.216	NB	0.680	NB	-0.479	NB
	two years before	1.012	B	-1.254	NB	0.531	B	0.407	NB	0.634	NB	-0.247	NB
	three yaers before	0.811	B	-1.675	NB	0.602	B	0.841	NB	0.624	NB	-1.272	NB
SMMT	one year before	1.963	GA	-2.413	NB	0.550	B	-0.382	B	0.421	NB	1.516	B
	two years before	1.335	GA	-2.143	NB	0.322	B	-0.166	NB	0.273	NB	0.538	B
	three yaers before	0.956	B	-1.884	NB	0.045	B	0.030	NB	0.041	NB	0.371	NB
PGLI	one year before	3.566	NB	-3.080	NB	0.018	B	0.156	NB	-0.063	B	-1.216	NB
	two years before	2.597	NB	-2.793	NB	-0.015	B	0.192	NB	-0.118	B	-0.815	NB
	three yaers before	6.982	NB	-3.481	NB	0.291	B	0.648	NB	0.273	NB	-1.560	NB
DWGL	one year before	-1.076	B	1.618	B	0.620	B	-0.137	NB	0.452	NB	1.229	B
	two years before	-5.924	B	4.944	B	-1.187	B	-0.029	NB	-1.010	B	2.023	B
	three yaers before	-0.871	B	0.510	B	0.031	B	-1.767	NB	-0.120	B	2.145	B

Source: Processed data, 2023.

The following is the percentage accuracy of bankruptcy prediction using the six prediction models:

Table-5: Model Prediction Accuracy

	Altman	Zmijewski	Springate	CA-Score	Grover	Ohlson
Prediction accuracy	56	54	40	28	48	13
Total obeservations	72					
Percentage	77.8%	75.0%	55.6%	38.9%	66.7%	18.1%

Source: Processed data, 2023.

Table-5 shows that as many as 72 observations made of companies that were delisted and those that were still listed stated that the Altman model was superior with an accuracy of prediction of 77.8%, followed by the Zmijewski model of 75%.

Multicollinearity Test

An assumption test using multicollinearity is carried out to find out whether the independent variables have a relationship. The results of the multicollinearity test are said to be good if the independent variables have no relationship. This can be seen by looking at the value of the correlation coefficient of each independent variable. If the coefficient value is <0.8, it is said that there are no symptoms of multicollinearity between the independent variables (Ghozali, 2011). The following is a summary of the results of testing the correlation coefficient of the multicollinearity test.

Table-6: Multicollinearity Test

Variabel	Constant	Altman	Zmijewski	Springate	CA_Score	Grover	Ohlson
Constant	**1,000**	-0.733	0.246	0.074	-0.086	0.367	-0.349
Altman	-0.733	**1,000**	-0.381	0.114	-0.135	-0.271	-0.05
Zmijewski	0.246	-0.381	**1,000**	-0.014	-0.286	0.133	-0.244
Springate	0.074	0.114	-0.014	**1,000**	-298	-0.695	-0.075
CA_Score	-0.086	-0.135	-0.286	-298	**1,000**	0.174	0.331
Grover	0.367	-0.271	0.133	-0.695	0.174	**1,000**	-0.249
Ohlson	-0.349	-0.05	-0.244	-0.075	0.331	-0.249	**1,000**

Source: Processed data, 2023.

The table above shows that in this study the independent variables have a correlation between each method variable. Altman Z-Score model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model produce a coefficient value of <0.8 it can be seen that the independent variable in the regression model of this study is stated that there are no multicollinearity symptoms. It can be assumed that multicollinearity is declared fulfilled.

Model Feasibility Test Results (Goodness of Fit Model)

*Goodness of fit*the model (Hosmer and Lemeshow Test) is carried out so that whether the model and observation data are suitable or the model formed is feasible to be used to predict the relationship between the independent variables and the dependent variable (Ghozali, 2009). The model is said to be feasible if the significant value > level of significance (α). The results of the goodness of fit test can be seen in the following table:

Table-7: Hosmer and Lemeshow Test

Hosmer and Lemeshow Test		
Chi-square	**Df**	**Sig.**
3.375	8	0.909

Source: Processed Data, 2023.

Based on table-7, it shows that the Chi-square test statistical value is 3.375 with a significance value of 0.909. The test results indicate that the significant value > level of significance (α= 5%) so that it accepts H_0 or in other words the model is accepted. It can be stated that the model formed matches the observation data, which is feasible to be used to predict the effect of bankruptcy prediction using the Altman Z-Score model method, the Zmijewski model, the Springate model, the CA-Score model, the Grover model, and the Ohlson model on the bankruptcy of companies listed on the Stock Exchange. Indonesian Securities in 2008-2022.

Coefficient of Determination Test Results (Nagelkerke R.Square)

Ghozali (2013) explains that the coefficient of determination test uses the Nagelkerke R Square to find out how much it contributes to the influence of bankruptcy prediction using the Altman Z-Score model method, the Zmijewski model, the Springate model, the CA-Score model, the Grover model, and the Ohlson model to company bankruptcy on the IDX. 2008-2022. The following is the result of testing the coefficient of determination.

Table-8: Pseudo R-Square (Nagelkerke R-Square) Model Summary

Cox & Snell R Square	Nagelkerke R Square
0.309	0.412

Source: Processed data, 2023.

Testing the coefficient of determination (Nagelkerke R2) was obtained at 0.412 or 41.2%. This means that the company's bankruptcy variable can be explained by the bankruptcy prediction variable using the Altman model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model which is 41.2%. In other words, the contribution of bankruptcy prediction using the Altman model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model to company bankruptcy is 41.2%. The remaining 58.8% indicates that the contribution is from other variables not discussed in this study.

Simultaneous Hypothesis Testing (Overall Model Fit)

The test criteria state if the significance value is <level of significance (α) then there is a significant effect simultaneously on bankruptcy prediction using the Altman Z-Score model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model on company bankruptcy (Widarjono, 2010). The following presents the results of simultaneous hypothesis testing.

Table-9: Omnibus Test Results

Omnibus Test – Likelihood Ratio			
	Chi-square	**df**	**Sig.**
Full Model	26.587	6	0.000

Source: Processed data, 2023.

Simultaneous significance testing produces a Chi-square value of 26.587 with a significance of 0.000. The test results show a significance value < level of significance (α=5%) thus

rejecting H_0. It is stated that there is a significant effect simultaneously on bankruptcy prediction using the Altman model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model on company bankruptcy or in other words the model is declared FIT.

Partial Hypothesis Testing

The test criteria state if the significant value < level of significance (α) then there is a significant effect partially on the bankruptcy prediction of the Altman Z-Score model, Zmijewski model, Springate model, CA-Score model, Grover model, and Ohlson model on company bankruptcy (Widarjono, 2010). In the following, the results of the partial hypothesis test are presented.

Table-10: Partial Test Results

Independent Variabel	B	S.E.	Wald	df	Sig.	Odd Ratio
Altman	0.148	0.184	0.643	1	0.423	1.159
Zmijiewski	-0.287	0.127	5.079	1	0.024	0.751
Springate	-0.209	0.172	1.472	1	0.225	0.811
CA-Score	0.368	0.117	9.9	1	0.002	1.444
Grover	0.027	0.184	0.021	1	0.885	1.027
Ohslon	0.437	0.157	7.74	1	0.005	1.548
Constant	-1.139	0.635	3.221	1	0.073	0.32
Level of Significance: *** α = 1% ** α = 5% *α = 10%						

Source: Processed data, 2023.

The first hypothesis testing was carried out to find out whether the sixth could significantly explain company bankruptcy.Based on table 4.7, it shows the results of the partial significance test of the Altman Z-Score model variable for the Wald test statistical value of 0.643 with a significance value of 0.423. The test results show a significance value > level of significance (α= 5%) then H_0 is accepted or in other words the model is not acceptable. The Zmijewski model for the Wald test statistical value is 5.079 with a significance value of 0.024. The test results show a significance value < level of significance (α= 5%) then reject H_0 or in other words the model can be accepted. The Springate model for the Wald test statistical value is 1.472 with a significance value of 0.225. The test results show a significance value > level of significance (α= 5%) then H_0 cannot be rejected or in other words the model cannot be accepted. The CA-Score model for the wald test statistical value is 9.900 with a significance value of 0.002. The test results show a significance value < level of significance (α= 5%) then reject H_0 or in other words the model can be accepted. The Grover model for the Wald test statistical value is 0.021 with a significance value of 0.885. The test results show a significance value > level of significance (α= 5%) then H_0 cannot be rejected or in other words the model cannot be accepted. The Ohlson model for the Wald test statistical value is 7.74 with a significance value of 0.005. The test results show a significance value < level of significance (α= 5%) then H_0 cannot be rejected or in other words the model cannot be accepted.

Testing the significance of the partial constanta produces a statistical value of the Wald test of 3.221 with a significance value of 0.073. The test results show the probability < level of significance (α= 10%). It can be said that there is a significant influence of constanta on corporate bankruptcy.

Discussion

Based on the results of the analysis, it shows that the Zmijewski model is the best predictive model in predicting corporate bankruptcy because the Zmijewski model can significantly explain corporate bankruptcy and also has the highest level of accuracy or prediction accuracy compared to the Altman model, Springate model, CA-Score model, Grover model, and the Ohlson model.

The prediction models used in this study each have differences in the components that form the model, resulting in different levels of accuracy. The Zmijewski model is formed by components of financial ratios, namely ROA (EAT/TA), DAR (total liabilities/total assets), and current ratio (current assets/current*liabilities)*.Some of the forming components of the Zmijewski model are also used as one of the forming components in other models. Table 4.16 presents the component data forming each model.

Table-11: Matrix of Altman, Springate, Zmijewski, CA-Score, Grover, and Ohlson model building components.

Komponen Pembentuk / Model	Altman	Zmijewski	Springate	CA-Score	Grover	Ohlson
WC/TA	V				V	V
RE/TA	V					
EBIT/TA	V		V		V	
BEV/BVD	V					
EAT/TA		V			V	
TL/TA		V				V
CA/CL		V				
WC/TA			V			
EBT/TA			V			
Sales/TA			V	V		
Shareholder/TA				V		
EBT+FE/TA				V		
Log(TA/GNP)						V
CL/CA						V
CFO/TL						V
NI-(NI-1)/NI+(NI-1)						V

Source: Processed data, 2020.

Table-11 shows that some prediction models use the same forming components or financial ratios so that there are slices of the forming components of each model. The ratio of WC/TA (working capital/total assets) is used in the Altman, Grover and Ohlson models. The EBIT/TA ratio (earnings before interest taxes/total assets) is used in the Altman, Springate and Grover model building components. The EAT/TA ratio (Earnings after taxes/total assets) is used in Zmijewski and Grover's model. The TL/TA ratio (total liabilities/total assets) is used in Zmijewski and Ohlson's model. Meanwhile, the Sales/TA ratio (sales/total assets) is used in the Springate and CA-Score models.

It can be seen that the components forming the Zmijewski model, namely the Profitability ratio (EAT/TA) and DAR (TL/TA), are used in the components forming the Grover and Ohlson models, respectively. Meanwhile, the liquidity ratio (CA/CL) is not a component

of the other models. So the liquidity ratio (CA/CL) is a differentiating factor in the components of the Zmijewski model.

One of the components forming the Zmijewski model that is used by the Grover model is the current ratio. However, in the Grover model the current ratio has the smallest contribution to the final value. So that the tendency of large debts to delisted companies has not been able to predict a company in a state of bankruptcy. Meanwhile, the Ohlson model uses one of the components forming the Zmijewski model, namely DAR. DAR in the Ohlson model has a more dominant contribution to the final value. However, the Ohlson model consists of nine forming components which ultimately reduce the level of accuracy or precision of its predictions. The low prediction accuracy of the Ohlson model is due to the listing category, the model is unable to accurately predict companies that are still listed. This is because in the listing category companies tend to have large debts as well and make the DAR value even greater. So companies that are still healthy or listing are predicted to experience bankruptcy.

It can be seen that a company that has a large debt does not necessarily reflect a company in a difficult situation, because the company has confidence that the company's performance will increase. The increase in work is indicated by increased profitability and sales growth, and is driven by the asset structure where the increase in fixed assets owned by a company can be used as collateral. It can be concluded that if the company is in a loss profit condition and has a large amount of debt, it will increase the chances of bankruptcy or the more precisely the company is predicted to be a delisted company.

The results of this study are in line with previous research conducted by M. Fakhri Husein and Galuh Tri Pambekti (2014) where in their research concluded that the Zmijewski model is the best predictor of financial distress because it has the highest level of significance compared to the Altman model, springate model, and the Grover model.

In the United States delisting companies, which are the object of observation using the Zmijewski prediction model, there is a tendency for the number of Earning After Taxes to be obtained in a state of loss or negative profit and also has a large amount of debt. This is one of the factors that makes the final value generated by the company using the Zmijewski model enlarge.

The following are the components that make up Zmijewski's prediction model

$$\text{Zmijewski Score} = -4.3 - 4.5\text{ROA} + 5.7\text{DAR} + 0.004\text{Current Ratio}$$

It can be seen that the forming component that has the greatest contribution in forming the final value of the Zmijewski model is DAR. The coefficient on the DAR shows a tendency for a larger value, so the ratio in the bankruptcy analysis model that is carried out is conditioned to increase the final score. Vice versa, if a ratio shows an improved condition or a smaller DAR value, then the final score will be reduced. DAR is a ratio or forming component that has a more dominant contribution compared to the ratio of ROA and Current Ratio to the final value. So if a delisted company has a Zmijewski model value that tends to get bigger, then this shows that the company's performance is getting worse and the probability of bankruptcy is very large.

Based on the analysis that has been carried out on the components forming the Zmijewski model, it can be seen that the Zmijewski model has the highest level of accuracy or accuracy

of predictions because companies in the delisting category have a tendency for the number of Earning After Taxes to be obtained in a loss profit or negative state and the amount of debt tends to increase. This shows that the company bears quite large liabilities but the resulting profitability is not optimal.

Likewise in the listing category, the company that is the object of observation has a fairly large amount of debt. This is one of the factors that makes the final value generated by the company using the Zmijewski model enlarge. However, several listing companies that were the object of observation were able to generate positive profit or earnings after taxes. It can be seen that a company that has a large debt does not necessarily reflect a company in a difficult situation, because the company has confidence that the company's performance will increase. The increase in work is indicated by increased profitability and sales growth, and is driven by the asset structure where the increase in fixed assets owned by a company can be used as collateral. It can be concluded that if the company is in a loss profit condition and has a large amount of debt, it will increase the chances of bankruptcy or the more precisely the company is predicted to be a delisted company.

The results of this study are in line with previous research conducted by M. Fakhri Husein and Galuh Tri Pambekti (2014) where in their research concluded that the Zmijewski model is the best predictor of financial distress because it has the highest level of significance compared to the Altman model, springate model, and the Grover model.

CONCLUSION

This study aims to determine the best bankruptcy prediction model that can be used to predict corporate bankruptcy in companies listed on the Indonesia Stock Exchange using the Binary Logistic Regression analysis method.The results of the study prove that of the six bankruptcy prediction models that can significantly explain corporate bankruptcy are the Zmijewski model, the CA-Score model, and the Ohlson model. However, the prediction model that has the most accurate level of prediction accuracy is the Zmijewski model. This is because the delisted companies that are the object of observation have a tendency for the number of Earning After Taxes to be obtained in a loss profit or negative state and the amount of debt which tends to be very large

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