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# Company Bankruptcy Prediction Analysis: The Altman Z"-Score Method

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The purpose of this study is to analyze the effect of the ratio of Working Capital to Total Asset, Retained Earnings to Total Asset, Earnings Before Interest and Tax to Total Asset, and Market Value of Equity to Book Value of Liability on bankruptcy predictions. The sample used was ten companies obtained by purposive sampling method from State-Owned Enterprises in the infrastructure services sector listed on the Indonesia Stock Exchange during the 2021-2023 period. This study is a quantitative research using the logistic regression estimation method processed using the Statistical Package for Social Sciences 30 software. The results of the study using the Wald Test found that Working Capital to Total Asset had a significant negative effect on bankruptcy prediction, while Retained Earnings to Total Asset, Earnings Before Interest and Tax to Total Asset, and Market Value of Equity to Book Value of Liability had no significant influence on bankruptcy prediction. In addition, the results of the Omnibus Test of Model Coefficients mentioned that all independent variables simultaneously have a significant effect on bankruptcy prediction.

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#### INTRODUCTION

Infrastructure development has become a national priority in President Joko Widodo's administration as an effort to equitably distribute the economy. This is reflected in the large infrastructure budget, as in 2021 which reached IDR 417.4 trillion. State-Owned Enterprises (SOEs) in the infrastructure services sector play an active role in these projects, but the increased participation triggers increased debt and financial risks. The COVID-19 pandemic has exacerbated this condition, with a 48.27 percent decrease in EBITDA and disruptions in project implementation due to mobility restrictions.

Although in 2023 the revenue of SOEs in the infrastructure services sector increased to IDR 153.7 trillion, this sector still recorded a loss of IDR 740 billion. The high proportion of debt, which is 50.9 percent of total investment, exceeds the risk tolerance threshold set by the Ministry of SOEs, thus indicating unhealthy financial conditions and potentially leading to financial distress. Financial distress is a bad and sustainable financial condition in a company, characterized by low liquidity, inability to pay debts, and restrictions on dividend distribution and access to resources (Agostini, 2018). Arifin (2018) explained that this condition occurs when operating cash is insufficient to pay off obligations, and if it occurs continuously, it can be the initial stage of bankruptcy. Altman et al. (2019) states that there are four terms that are often used in formulating indications of a state of distress in a company, namely: failure, insolvency, default, and bankruptcy.

The causes of bankruptcy according to Arifin (2018) are poor operational performance, high leverage, lack of innovation, liquidity crisis, and high level of new business formation. To overcome financial distress, companies can sell assets, cost efficiency, mergers, issue new securities, negotiate debt, or convert debt into equity (Arifin, 2018). Early detection through financial ratio analysis is also very important so that companies can immediately take corrective action (Prihadi, 2019).

Early detection of potential bankruptcy is important, one of which is through financial analysis methods. Altman Z"-Score is a widely used method because it combines various financial ratios through multiple discriminant analysis. The first ratio used in the Z"-Score analysis is the liquidity ratio proxied by Working Capital to Total Assets (WCTA). According to Carolina et al. (2017), a company with high liquidity indicates that it has sufficient current assets to pay its short-term debts. Therefore, the higher a company's liquidity, the lower its risk of experiencing financial distress. Damayanti et al. (2021) and Septiani & Dana (2019) concluded that the liquidity ratio has a significant negative effect on predicting financial distress. Meanwhile, research conducted by Pratama & Setiawati (2022) concluded that liquidity has no effect on predicting financial distress, meaning that high or low liquidity values do not influence financial distress predictions.

The next ratio in the Altman Z"-Score method is the profitability ratio, which is proxied by Retained Earnings to Total Assets (RETA) and Earnings Before Interest and Tax to Total Assets (EBITTA). According to Altman (2019), this ratio functions as a company performance indicator that focuses on the extent to which the company is able to generate profits from its investments. The higher the level of profitability achieved by a company, the better its ability to generate profits, thereby reducing the likelihood of bankruptcy (Masitoh & Setiadi, 2020). Research by Suniah & Herawati (2020) and Damayanti et al. (2021) found that profitability has been shown to influence financial distress prediction. However, research by Suryani (2020) concluded differently, finding that profitability ratios did not influence financial distress prediction.

The final ratio in the Altman Z"-Score method is the solvency ratio or leverage ratio which is proxied by the Market Value of Equity to Book Value of Liability (MVEBVL). The greater the debt portion in the capital structure, the higher the risk a company faces, thus increasing the likelihood of experiencing financial distress. This is consistent with research by Azizah & Yunita (2022), which found that the solvency ratio has a significant positive effect on financial distress. Conversely, research by Asmarani & Purbawati (2020) found that the solvency ratio has no effect on financial distress.

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Based on the phenomenon and differences in previous research results, this study aims to further examine the influence of the WCTA, RETA, EBITTA, and MVEBVL ratios partially and simultaneously on bankruptcy prediction. The object of this research is state-owned companies in the infrastructure services sector listed on the Indonesia Stock Exchange in the period of 2021–2023.

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#### LITERATURE REVIEW

#### Bankruptcy

Financial distress is a bad and sustainable financial condition in a company, characterized by low liquidity, inability to pay debts, and restrictions on dividend distribution and access to resources (Agostini, 2018). Arifin (2018) explained that this condition occurs when operating cash is insufficient to pay off obligations, and if it occurs continuously, it can be the initial stage of bankruptcy. Altman et al., (2019) states that there are four terms that are often used in formulating indications of a state of distress in a company, namely: failure, insolvency, default, and bankruptcy.

The causes of bankruptcy according to Arifin (2018) are poor operational performance, high leverage, lack of innovation, liquidity crisis, and high level of new business formation. To overcome financial distress, companies can sell assets, cost efficiency, mergers, issue new securities, negotiate debt, or convert debt into equity (Arifin, 2018). Early detection through financial ratio analysis is also very important so that companies can immediately take corrective action (Prihadi, 2019).

### Altman Z" score Method

Altman Z"-Score is a bankruptcy prediction analysis method introduced by Altman. This method utilizes the statistical technique of Multiple Discriminant Analysis (MDA) where this model combines several ratios in one equation (Altman et al., 2019). The formula of this method is:

$$Z$$
" = 3,25 + 6,56 $X_1$  + 2,26 $X_2$  + 6,72 $X_3$  + 1,05 $X_4$ 

## **Liquidity Ratio**

The Liquidity Ratio according to the explanation Hutabarat (2020) is a useful analysis tool to see the company's ability to meet its short-term obligations. A company is considered liquid if it has the ability to pay its short-term obligations before maturity (Hery, 2023). Based on the statement Sukamulja (2022), in measuring liquidity, there are various indicators and ratios used. In the Z"-Score method, the liquidity ratio used is the WCTA ratio. This ratio explains liquidity in terms of net working capital, the lower the value, the lower the net working capital liquidity.

### **Profitability Ratio**

Ompusunggu & Wage (2021) explains that the profitability ratio is a comparison used to assess the extent to which a company has succeeded in obtaining profits from earnings related to sales, assets, and equity in accordance with certain valuations. In this study, the profitability ratio used in the Altman Z"-Score method was proxied with the RETA and EBITTA ratios. Here is the explanation:

- 1. Retained Earnings to Total Asset (RETA) RETA is a ratio to assess the level of profitability of a company by comparing retained earnings with total assets. In addition, this ratio serves to evaluate business efficiency using the speed of turnover of operating assets.
- 2. Earningss Before Interest and Tax to Total Asset (EBITTA) EBITTA is a profitability ratio that measures the efficiency of the use of assets and invested capital, including stocks and bonds. This ratio is calculated by dividing earnings before interest and taxes (EBIT) by the company's total assets.

#### Solvency Ratio

The solvency ratio is a ratio to assess the extent to which a company is able to fulfill all short-term and long-term obligations (Prihadi, 2019). According to Kasmir (2019), there are two approaches to calculating this ratio, namely through the balance sheet and profit and loss approaches. The solvency ratio in this study was proxied with MVEBVL. The MVEBVL ratio is used to assess a company's ability to guarantee its debt with its own capital (Hutabarat, 2021).

#### **Previous Research**

Many previous studies have also conducted research on the influence of the Altman Z-Score ratio on predicting financial distress. Lestari et al. (2021) studied a sample of automotive and component sub-sector companies listed on the Indonesia Stock Exchange. The results showed that, partially, the WCTA, EBITTA, RETA, and MVEBVL ratios had a significant negative effect on predicting bankruptcy. This finding aligns with research conducted by Permatasari (2019), which concluded that, partially, the WCTA, RETA, EBITTA, and MVEBVL ratios had a significant negative effect on predicting financial distress. A different conclusion was drawn from research by Widiyawati et al. (2015), which stated that, partially, the WCTA, RETA, and MVEBVL ratios did not affect financial distress prediction. Meanwhile, the EBITTA ratio had a significant negative effect on predicting financial distress.

Research by Lestari et al. (2021), Widiyawati et al. (2015), and Permatasari (2019) concluded that the WCTA, RETA, EBITTA, and MVEBVL ratios had a significant negative effect on predicting financial distress. simultaneously predicting financial distress. This proves that the Altman Z-Score ratio can predict financial problems experienced by companies, even bankruptcy (Widiyawati, 2015).

Referring to the theoretical research and the results from previous studies that have been described previously, so that several hypothesis formulations are proposed.

H<sub>1</sub>: WCTA has a significant negative effect on bankruptcy prediction

H<sub>2</sub>: RETA has a significant negative effect on bankruptcy prediction

H<sub>3</sub>: EBITTA has a significant negative effect on bankruptcy prediction

H<sub>4</sub>: MVEBVL has a significant negative effect on bankruptcy prediction

H<sub>5</sub>: WCTA, EBITTA, RETA, and MVEBVL simultaneously influence bankruptcy prediction.

The research framework is systematically illustrated as follows:

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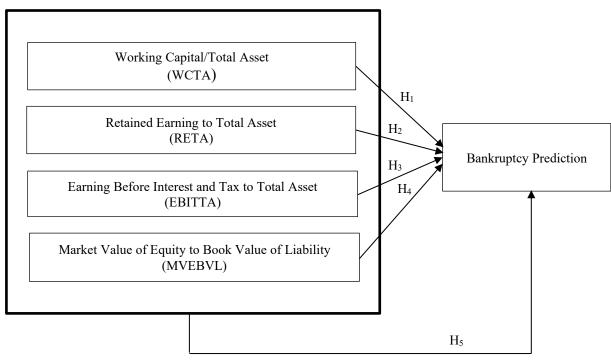


Figure 1. Research Framework

Source: Resercher (2025)

## **METHODS**

The design of this research is a quantitative research with descriptive and associative forms. The dependent variable in this study is financial distress, with four independent variables, namely the WCTA, RETA, EBITTA, and MVEBVL ratios. The operationalization variable of this research will be explained in Table 1.

Table 1 Operationalization Variable

Variable	Variable Definition	Measurement	Scale
Financial	Describes a negative	Including binary variables, a score	Nominal
Distress	situation experienced by a	of 1 for companies predicted to	
	company on a continuous basis, where the company	experience financial distress, and a score of 0 for companies predicted	
	experiences poor financial	not to experience financial distress	
	conditions. Financial	not to experience imaneiar distress	
	distress is predicted using		
	the Altman Z-Score		
	method		
WCTA	Describes a company's		Ratio
$(X_1)$	liquidity in terms of	Working Capital	
	working capital, which	Total Asset	
	explains the company's		
	ability to meet its short-		
DETA	term financial obligations	Datain ad Eassin as	D.4
RETA	Describes a company's	Retained Earnings	Ratio
$(X_2)$	profitability over a specific	Total Asset	
	period by comparing		
	_		
	retained earnings with total assets		

Variable	Variable Definition	Measurement	Scale
EBITTA	Describes a company's	EBIT	Ratio
(X <sub>3</sub> )	ability to generate profits based on the use of invested assets or capital, including shares and bonds	Total Asset	
MVEBVL (X <sub>4</sub> )	Describes the extent to which a company secures its debts through its own capital	Market Value of Equity Book Value of Liability	Ratio

Source: Researcher (2025)

The population used includes ten state-owned companies in the infrastructure services sector listed on the Indonesia Stock Exchange (IDX) for the 2021-2023 period. The sampling technique in this study uses a saturation sampling. The companies sampled are summarized in Table 2.

Table 2. Sample of State-Owned Companies in the Infrastructure Services Sector Listed on the IDX Year 2021-2023

No.	<b>Company Code</b>	Name
1.	WSKT	PT Waskita Karya (Persero) Tbk
2.	ADHI	PT Adhi Karya (Persero) Tbk
3.	WTON	PT Wijaya Karya Beton Tbk
4.	PTPP	PT Pembangunan Perumahan (Persero) Tbk
5.	FISH	PT Wijaya Karya (Persero) Tbk
6.	PPRO	PT PP Properti Tbk
7.	JSMR	PT Jasa Marga (Persero) Tbk
8.	WSBP	PT Waskita Beton Precast Tbk
9.	SMGR	PT Semen Indonesia (Persero) Tbk
10.	SMBR	PT Semen Baturaja Tbk

Source: Processed Data (2025)

The type of data in this study is quantitative data. Meanwhile, the source of data for this study is secondary data. The secondary data used is the annual financial statements that have been audited by each company during the 2021-2023 period. The data was obtained through the official website of the Indonesia Stock Exchange (www.idx.co.id) as well as the website of each company that is the object of the research.

The data collection method in this study is the documentation method and the literature research method by analyzing study sources and literature through books, journals, and research results from previous researchers related to this research. The data analysis used in this study is descriptive statistical analysis and logistic regression analysis with the help of SPSS 30 quantitative data software.

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# RESULT AND DISCUSSION

#### Result

#### **Descriptive Statistical Analysis**

This analysis includes the mean value, lowest value (minimum), highest value (maximum), and standard deviation for each variable. The following are the results of the descriptive statistical analysis:

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Table 3. Statistics Descriptive

	Financial	WCTA	RETA	<b>EBITTA</b>	MVEBVL
	<b>Distress</b>				
Mean	0,5000	0,0035	-0,0557	0,0323	0,4863
Maximum	1	0,28	0,43	0,19	2,71
Minimum	0	-0,79	-1,83	-0,19	0,04
Std. Dev.	0,50855	0,2284	0,5143	0,5894	0,6286
N	30	30	30	30	30

Source: SPSS Output (2025)

Throughout the study period between 2021-2023, the average WCTA ratio was 0.0035 or 0.4 percent. The maximum value of WCTA of 0.28 or 28 percent is owned by PT PP Property Tbk in 2021. Meanwhile, the minimum WCTA value of -0.79 or -79 percent was recorded by PT Waskita Beton Precast Tbk in 2021. The standard deviation of the WCTA is 0.2284, this figure is greater than the average result of the WCTA so that the data is diverse and scattered (not concentrated) so that the mean is less able to describe the overall distribution of the sample company data.

The average RETA value of sample companies during the 2021-2023 research period was -5.6 percent. The maximum value of RETA is 0.43 or 43 percent owned by PT Semen Indonesia (Persero) Tbk in 2023. The minimum RETA value of -1.83 was recorded by PT Waskita Beton Precast Tbk in 2023. The standard deviation of RETA is 0.5143, which is greater than the RETA average, indicating that the data has a high degree of variation. This indicates that the data is scattered and not centralized around the average, so that the average RETA in this study is less able to describe the overall data of the sample company.

The mean or average of EBITTA in the sample companies in 2021-2023 is 0.0323 or 3.23 percent. The maximum value of EBITTA is 0.19 owned by PT Waskita Beton Precast Tbk in 2022 while the minimum value of EBITTA was also recorded by PT Waskita Beton Precast Tbk worth -0.19 in different years, namely 2021. The standard EBITTA deviation is 0.5894 or greater than the average EBITTA value, meaning that the data is ungrouped and scattered so that the mean is less able to represent the overall EBITTA data of the sample company.

The average MVEBVL value is 0.4864 or 49 percent. The maximum value of MVEBVL is 2.71 recorded by PT Semen Baturaja Tbk in 2021. Meanwhile, the minimum value of MVEBVL was recorded by PT Wijaya Karya (Persero) Tbk in 2023 worth 0.04 or 4 percent. The standard deviation of MVEBVL is 0.6286 or 63 percent, this value is greater than the MVEBVL average which shows if the distribution of data is uneven.

The financial distress variable includes the dummy variable, where the value of 1 is the company that is predicted to experience financial distress. Meanwhile, the value of 0 is the company that is predicted not to experience financial distress.

## **Logistic Regression Estimation**

There are four stages of model feasibility testing carried out in logistics regression estimation, which include Overall Model Fit, Regression Model Goodness Test, Coefficient of Determination (Nagelkerke's R Square), and Classification Matrix. The following is an explanation of the results of the four tests:

#### **Overall Model Fit**

According to Ghozali (2021), the Overall Model Fit test is used to assess whether a hypothesized model fits with data or not. Here are the results of the Overall Model Fit Test.

Table 4. Itteration History (Block 0: Beginning Block)

Iteration	-2 Log likelihood	Coefficients Constant
Step 0 1	41.455	133
2	41.455	134

Source: SPSS Output (2025)

Table 4 obtained -2 initial likehood logs (block number = 0) of 41,455. If this result is higher than the value of -2 of the final likehood log, then the regression model fits with the data.

Table 5. Itteration History (Block 1: Method=Enter)

Coefficients						
Iteration	-2 Log likelihood	Constant	WCTA	RETA	EBITTA	MVEBVL
Step 1 1	32.350	.017	-3.932	.096	577	577
2	29.070	.364	-8.426	.183	739	739
3	27.203	.880	-14.674	.245	886	886
4	26.843	1.234	-18.842	.269	-1.013	-1.013
5	26.824	1.336	-20.058	.273	-1.053	-1.053
6	26.824	1.342	-20.131	.274	-1.056	-1.056
7	26.824	1.342	-20.131	.274	-1.056	-1.056

Source: Output SPSS (2025)

In Table 5 the value of -2 the final likehood log (block number=1) is 26.824. That means the model fits the data, because there is a decrease in the value of -2 final likehood logs compared to -2 initial likehood logs (block number = 0).

#### **Goodness of Fit Test**

This test is carried out to ensure if the model is suitable for analysis or is fit. The method used is Hosmer and Lemeshow's which is measured with chi squares (Ghozali, 2021). The following are the results of the regression model feasibility test.

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Table 6. Hosmer and Lemeshow Test ep Chi-square df Itself.

Source: Output SPSS (2025)

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,858

Based on Table 6, it can be seen that the significance value of the Hosmer and Lemeshow test is greater than 0.05 (probability > 0.05) which is 0.858. The result is that the model is worth analyzing and can predict the value of its observations.

3,996

### **Determination Coefficients (Nagelkerke's R Square)**

This test model is carried out to assess how much independent variables can explain dependent variables (Ghozali, 2021). The output of the determination coefficient test with Nagelkerke's R Square method is:

 Table 7. Nagelkerke R Square

 -2 Log
 Cox & Snell R Square
 Nagelkerke R Square

 Step
 likelihood
 Square
 Square

 1
 26,824a
 ,386
 ,515

Source: Output SPSS (2025)

In accordance with Table 7 the value of Nagelkerke R Square is 0.515 which means that independent variables (WCTA, RETA, EBITTA, and MVEBVL) can explain a dependent variable (Bankruptcy Prediction) worth 51.5 percent, so that 48.5 percent of the bankruptcy prediction variable is explained by other independent variables.

#### **Classification Matrix**

According to Ghozali (2021), the classification matrix is used to illustrate the extent of the power of regression models in predicting the relationship between the Altman Z"-Score ratio and bankruptcy predictions. The classification matrix is presented in Table 8.

Table 8. Classification Matrix

		Predicted Financial Distress (Z)				
	Obse	erved	No Financial Distress Occurs	Financial Distress Occurs	Percentage Correct	
	Financial	No Financial Distress Occurs	15	1	93,8	
Step 1	Distress (Z)	Financial Distress Occurs	4	10	71,4	
	Overall P	ercentage	200 0 (20		83,3	

Source: SPSS Output (2025)

In accordance with Table 8 it can be interpreted that as a whole, as many as 83.3 percent are predicted to be correct by the model. This means that the model used in this study can show predictions that can be taken for granted.

# **Hypothesis Test**

The hypothesis test in this study was carried out by partial testing (t-test) with the Wald Test. The results of the test were:

Table 9. Wald Test (Partial T Test)

		В	S.E.	Wald	df	Sig.
Step 1a	Working Capital to Total Asset	-20.131	9.740	4.271	1	.039
	Retained Earning to Total Asset	.274	.918	.089	1	.765
	Earning Before Interest and Tax to Total Asset	3.031	8.261	.135	1	.714
	Market Value of Equity to Book Value of Liability	-1.056	.895	1.393	1	.238
	Constant	1.342	1.041	1.660	1	.198

Source: SPSS Output (2025)

The hypothesis used in the t-test states that if the P-Value (sig) < 0.05, then the independent variable has a significant effect on the dependent variable. In Table 9, of the four independent variables, only WCTA has a P-Value (sig) < 0.05, which is 0.039, so that WCTA has a significantly negative effect on bankruptcy prediction, while other variables, namely RETA, EBITTA, and MVEBVL have no effect on bankruptcy prediction because it has a P-Value (sig) of more than 0.05, which is 0.765, 0.714, and 0.238, respectively.

Discussion of the results of logistic regression estimation based on Table 9:

#### Discussion

### The Effect of Working Capital to Total Assets (WCTA) on Bankruptcy Prediction

The results of the study show that the WCTA ratio has a significant negative effect on bankruptcy prediction, meaning that the higher the WCTA, the less likely the company to experience financial distress. The WCTA measures liquidity in terms of net working capital, the difference between current assets and current liabilities, which is important for maintaining financial stability (Sukamulja, 2022). Companies with low WCTA are more prone to default, especially if their current liabilities are large (Altman et al., 2019). Adequate working capital allows operations to run smoothly and avoids short-term financial pressures, reflecting stable finances (Kasmir, 2019). These findings confirm the importance of working capital and liquidity management in financial strategies to prevent financial distress, in line with the views of Altman et al. (2019). This result is also supported by Lestari et al. (2021), although it is different from Widiyawati et al. (2015) who stated that WCTA has no effect.

## The Effect of Retained Earnings to Total Assets (RETA) on Bankruptcy Prediction

Based on the results of the study, RETA has no effect on bankruptcy prediction, so it cannot be used as a single indicator in predicting bankruptcy. This finding is in line

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with the research of Widiyawati et al. (2015), but contradicts Permatasari et al. (2019) who stated that RETA has a significant negative effect. In theory, this is not in accordance with the view of Altman et al. (2019) who consider RETA as an important indicator for predicting bankruptcy because it reflects the company's ability to maintain profits and manage long-term risks (Hutabarat, 2020). The insignificance of RETA is suspected to be due to the large size of retained earnings influenced by profit distribution and capital management policies, so low RETA does not necessarily reflect poor financial conditions (Susrama, 2024).

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# The Effect of Earnings Before Interest and Tax to Total Assets (EBITTA) on **Bankruptcy Prediction**

The results of the study show that the EBITTA ratio has no effect on bankruptcy prediction, so it cannot be used as the main indicator. This finding is in line with research Hikmah & Mutmainah (2021), but different from Lestari et al. (2021) which states that EBITTA has a significant negative effect. According to Widyastuti (2017), EBIT only reflects operational profitability before interest and taxes, so it does not include important aspects such as capital structure, investment decisions, and taxes (Prihadi, 2019). In addition, profitability is greatly influenced by the type of industry, and in the context of this study, the infrastructure services sector which has a high debt structure makes EBIT less reflective of financial risks.

# The Effect of Market Value of Equity to Book Value of Liability (MVEBVL) on **Bankruptcy Prediction**

The data analysis in this study shows that the MVEBVL ratio has no effect on bankruptcy prediction, so it cannot be used as the main indicator. These findings are in line with the statement (Altman et al., 2019) that market-based ratios such as MVEBVL cannot be a single indicator because they are influenced by external factors such as economic conditions, regulations, investor sentiment, and global events, so they do not reflect the fundamental condition of the company (Bakri et al., 2024). According to Arifin (2018), bankruptcy is more caused by the inability to generate cash to meet obligations, so even though the company has high equity, it does not guarantee that it is free from liquidity problems. This research is also supported by Widiyawati (2015) who found that MVEBVL has no effect on the prediction of financial distress, although it is different from Lestari et al. (2021) who stated that this ratio has a significant negative effect.

#### **CONCLUSION**

This study aims to analyze the effect of the ratio of Working Capital to Total Asset (WCTA), Retained Earnings to Total Asset (RETA), Earnings Before Interest and Tax to Total Asset (EBITTA), and Market Value of Equity to Book Value of Liability (MVEBVL) on bankruptcy predictions., using ten State-Owned Enterprises in the infrastructure services sector listed on the Indonesia Stock Exchange during the 2021-2023 period. Based on the results of data processing and discussion, it was concluded that WCTA has a negative effect on the prediction of bankruptcy. On the other hand, RETA, EBITTA and MVEBV partially have no effect on the prediction of bankruptcy in state-owned companies in the infrastructure services sector listed on the Indonesia Stock Exchange in 2021-2023.

This research has several limitations that can influence the research results. The model's ability to explain the independent variables is only 51.5 percent. This means that

there are still 48.5 percent of other factors outside of this research variable that can influence bankruptcy predictions. The short observation period, namely only 2021-2023, resulted in a small sample size. Then, the samples in this study were only state-owned companies in the infrastructure services sector listed on the Indonesia Stock Exchange, totaling ten companies according to existing criteria, so they did not have broad coverage.

For the next researcher, it is recommended to expand the scope of the research by considering variables with other types that have not been used in this study, both internal and external factors of the company. Besides that, it is recommended to extend the research period so that more data is used. In addition, it is better to use a more diverse sample, covering other sectors outside of infrastructure SOEs, to provide a more comprehensive picture. Finally, for financial analysts, investors, and financial managers not to use a single ratio in assessing bankruptcy risk because the implication does not provide a complete picture of the company's fundamental condition.

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