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## FINANCIAL DISTRESS ANALYSIS USING ALTMAN Z-SCORE AND ZMIJEWSKI MODELS: CASE STUDY OF PT CHANDRA ASRI PACIFIC TBK (2019-2023)

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### ABSTRACT

*This study aims to analyze the potential financial distress of PT Chandra Asri Pasific Tbk during the 2019-2023 period using two bankruptcy prediction models, namely Altman Z-Score and Zmijewski. The research method used in this research is descriptive qualitative method, this type of research data uses secondary data. Secondary data, obtained from the company's financial statements on the IDX web. The result of this study is that the value of the average EBIT and ROA indicators in 2019-2023 is quite low, namely 0.3%. However, overall the results of the altman Z-score model are said to be non-distress because it has a value greater than 2.6 and in the Zmijewski model the company is also said to be not bankrupt because the value is less than 0. The conclusion of this study is that although the finances of PT Chandra Asri Pasific Tbk fluctuate, the company is still able to manage financial performance and manage risks.*

**Keywords:** *financial distress, altman z-score, zmijewski and bankruptcy*

### ABSTRAK

Penelitian ini bertujuan untuk menganalisis potensi financial distress PT Chandra Asri Pasific Tbk selama periode 2019-2023 dengan menggunakan dua model prediksi kebangkrutan, yaitu Altman Z-Score dan Zmijewski. Metode penelitian yang digunakan dalam penelitian ini adalah metode deskriptif kualitatif, jenis data penelitian ini menggunakan data sekunder. Data sekunder, diperoleh dari laporan keuangan perusahaan yang ada di web BEI. Hasil penelitian menunjukkan bahwa nilai rata-rata indikator EBIT dan ROA pada tahun 2019-2023 cukup rendah, yaitu sebesar 0,3%. Secara keseluruhan, hasil dari model altman Z-score dikatakan tidak mengalami kebangkrutan karena memiliki nilai yang lebih besar dari 2,6 dan pada model

Zmijewski perusahaan juga dikatakan tidak mengalami kebangkrutan karena nilainya lebih kecil dari 0. Simpulan penelitian ini adalah meskipun keuangan PT Chandra Asri Pasific Tbk berfluktuasi, namun perusahaan masih mampu mengelola kinerja keuangan dan mengelola risiko.

Kata kunci: kesulitan keuangan, *altman z-score*, *zmijewski* dan kebangkrutan

JEL: B26, G01, P34

Diterima	: 10 Maret 2025
Ditinjau	: 25 Maret 2025
Dipublikasikan	: 25 Maret 2025

## 1. INTRODUCTION

The global economy is currently still in a state of uncertainty or volatility. This is due to significant challenges ranging from high global interest rates, limited government policy space, rising geopolitical tensions and volatile commodity prices to stricter environmental regulations. This is driven by several short-term factors, including the need to address the impact of the COVID-19 outbreak that has spread around the world and affected the global economy. Today, companies are forced to compete in international markets, making the management of working capital, liabilities and revenues increasingly complicated. *Financial distress* is a financial condition that indicates a company is facing difficulties in meeting its financial obligations. Economic development in Indonesia is very rapid compared to other countries, Indonesia is still in a stable category, along with increasing investment, household consumption and exports. And driven by sectors that continue to grow, such as digital technology, renewable energy and infrastructure. However, it is inversely proportional to the chemical company sector which as a result of covid-19 has experienced a decline in profits.

In this study, the object to be used is PT Chandra Asri Pasific Tbk by analyzing the company's financial statements for the period 2019-2023. PT Chandra Asri Pasific Tbk is one of the leading companies in Indonesia engaged in the petrochemical sector. The results of the analysis of the financial statements of PT Chandra Asri Pasific Tbk are as follows: Debt which increased drastically in 2019 amounting to Rp 23,475,263,888.89 to Rp.40,316,030,769.23 at the end of 2023. Own capital and sales also fluctuated from 2020 to 2023. Then experienced losses for two consecutive years. Therefore, it is necessary to conduct a *financial* evaluation to predict *financial distress* in the company.

According to Suryani & Mariani (2022: 4), *financial distress* or financial difficulty is a condition or situation that shows a company is at two extreme points starting from the company experiencing an inability to meet short-term financial obligations where the company is liquid to the occurrence of insolvable and if not resolved immediately it can experience bankruptcy. The current condition of PT Chandra Asri Pasific Tbk has decreased for two consecutive years which may experience bankruptcy. According to Goh & Edition (2023: 31) bankruptcy is when a person or company can no longer fulfill its financial obligations to the lender because the debt is due.

In company measurement, various analysis models are available to predict financial distress. To determine which model is more accurate in predicting corporate bankruptcy, the authors of this study decided to use the modified Altman Z-score model and the Zmijewski model. The Altman Z-score model is considered reliable in determining financial health, hence this approach is most commonly used by most companies. Altman's research on the application

of financial ratio analysis as a predictive tool resulted in the Z-score formula. Over time, Altman's approach has been adapted to different types of companies. Altman refined the model to be applicable to all companies, including manufacturing and non-manufacturing companies as well as bond issuers in developing countries (emerging markets)

The Zmijewski prediction method is a method developed by Zmijewski in 1983. The purpose of this method is to increase the value of financial indicator information as a tool to detect corporate financial failure. According to Irawan & Fajri, (2021), Zmijewski X-Score is a corporate bankruptcy analysis model that combines a combination of financial ratios and different weights for each variable. Therefore, this model is considered more efficient than similar models in predicting bankruptcy. Financial ratio analysis used to measure company liquidity (profit after tax/total assets), company performance (total debt/total assets) and debt to equity ratio (current assets/current liabilities). Calculating this ratio divides the X score value into two predetermined limit values. This strategy uses the number 0 as the threshold, In this study aims to determine the financial distress analysis at PT Chandra Asri Pasific Tbk using the *Altman Z-score* model and the Zmijewski model in 2019-2023. The apology for this research was carried out to identify financial ratios with a high level of bankruptcy and assess the company's risk of bankruptcy and can be information for investors before investing in the company. The main novelty of this research is the analysis of post-pandemic financial distress in the Indonesian petrochemical industry, then the comparison of two bankruptcy prediction models, which is rarely done in similar studies.

## 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### 2.1 Financial Distress

According to Agus S. Irfani (2020: 247) *financial Distress* describes the condition of the Company's failure to pay off its maturing debts and is accompanied by the elimination or reduction in dividend payments.

### 2.2 Bankruptcy

According to Abadi & Misidawati, (2023: 3) bankruptcy is an unstable company condition in running its business due to the inability to fulfill its obligations resulting in decreased profitability. Bankruptcy can be measured using the company's financial ratios.

### 2.3 Altman Z-Score

According to Goh & Edition, (2023: 37-38) *Altman Z-score (bankruptcy model)* is used as a measurable control tool for the financial status of a company that is experiencing financial difficulties (liquidity of business activities is disrupted). The *Altman* model has evolved over time by expanding the model that can predict all companies whether manufacturing go public, non public, or non manufacturing & bonds. Researchers use the modified Altman model which in 1995 there was a readjustment to the *Altman* formula to make adjustments to the type of industry. *Altman* made revisions to his calculation model so that it could be applied to manufacturing, non-manufacturing, and bond issuing companies in developing countries. In this modified *Z-Score* model, *Altman* removed the X5 variable (sales to *total assets*) because this ratio is considered to vary greatly in industries with different asset sizes. The *modified Z-Score* equation is as follows Abadi & Misidawati, (2023: 38)

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

Description:

Z''= bankruptcy index

- X1= working capital/total assets
- X2= retained earnings / total assets
- X3= earning before interest and taxes/total assets
- X4= book value of equity/book value of total debt

The classification of the Altman Z-Score calculation obtained a Z-Score value that has a cut off point as follows:

- a) If the value of Z "> 2.6 then not experiencing financial distress
- b) If the value is 1.1 < Z" < 2.6 then it is a gray area
- c) If the value of Z " < 1.1 then experiencing financial distress.

### 2.4 Zmijewski

Abadi & Misidawati, (2023: 40-41) Zmijewski is a model developed in 1983 which develops bankruptcy prediction by validating financial ratios as a detection tool for corporate failure. This study reviewed 20 years of bankruptcy research, with a sample of 75 bankrupt and 3573 healthy firms (1972-1978). The F-test results show significant differences in financial ratios, such as profitability, liquidity, leverage, turnover, firm size, and stock return volatility between healthy and unhealthy firms. The equation produces the following formula (Goh & Edition, 2023:42)

$$X = -4.3 - 4.5 X1 + 5.7 X2 - 0.004 X3$$

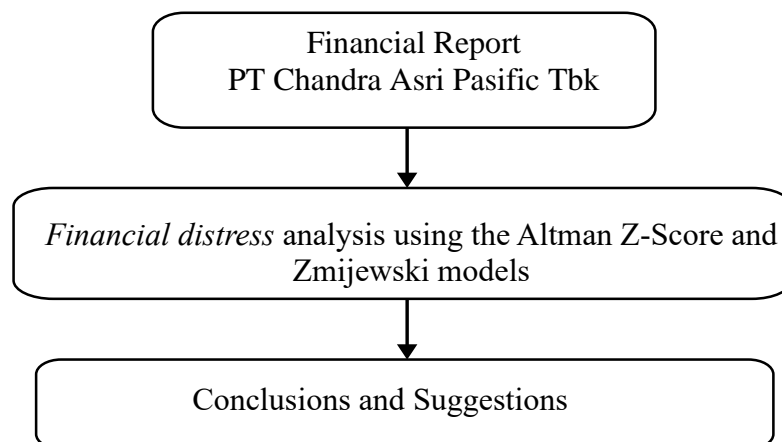
Description:

- X1: ROA (Return on Assets)
- X2: Leverage (Debt Ratio)
- X3: Likuditas (Current Ratio)

From the calculation of the zmijewski model, the X-Score cut off point is obtained:

- a. The company is said to be *non financial distress*, if X < 0
- b. The company is said to be *financially distressed*, if X > 0

### 2.5 Analysis Model

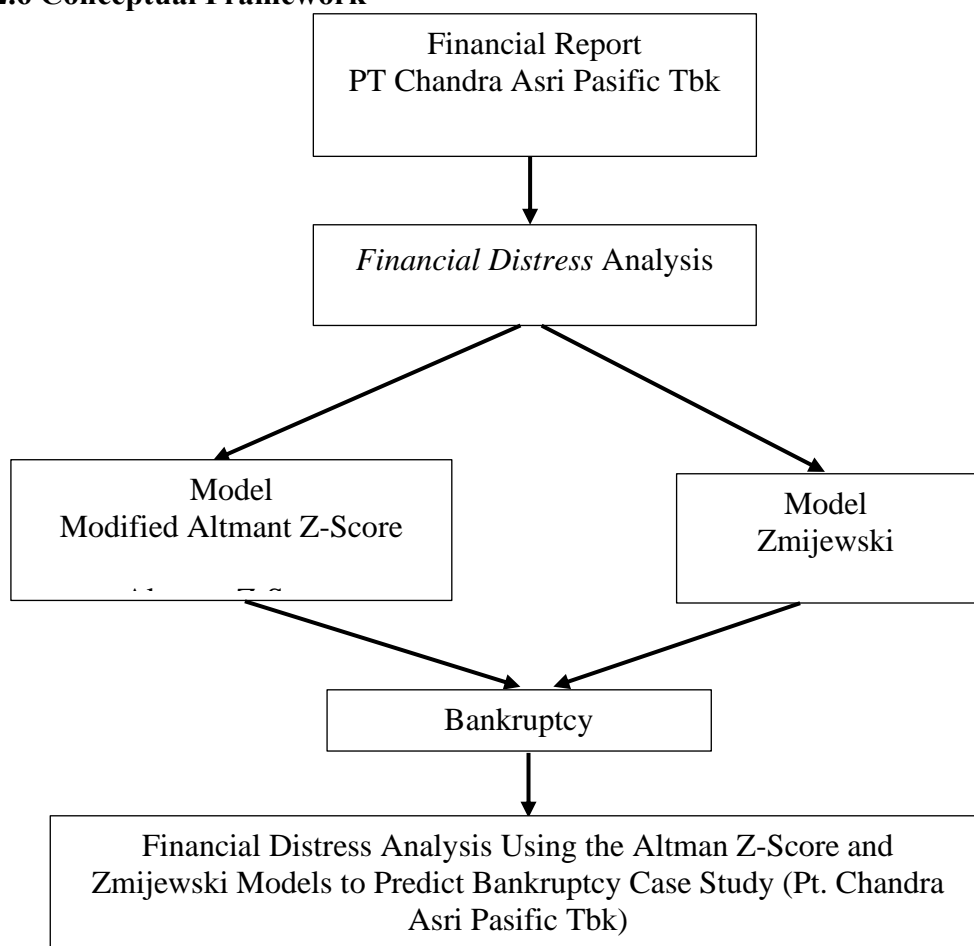


Source: Research (2024)

Figure 1. Analysis Model

In Figure 1. above, it can be seen the process of predicting company bankruptcy starting from the financial statements of PT Chandra Asri Pasific Tbk for the 2019-2023 period. Which then the data is processed using *financial distress* analysis with the *Altman Z-Score* and *Zmijewski* methods to determine which model is most accurate in predicting company bankruptcy and to determine the company's financial condition. Through these calculations, researchers can draw conclusions and suggestions from the research that has been done.

**2.6 Conceptual Framework**



Source: Reasearcher (2024)

Figure 2. Conceptual Framework

The company's financial statements are a means of communication with investors, creditors, management, government, and others. The published financial statements are intended to provide information to the parties regarding the company's performance and condition within a certain period of time. This study relies on the annual financial statements of PT Chandra Asri Pasific Tbk. This report was taken through the IDX website which uses the annual report for the 2019-2023 period, then the data is analyzed using *Financial Distress* analysis by comparing two models, namely the *altman Z-Score* and *Zmijewski* models to compare which method is the most accurate in predicting bankruptcy. After processing the data, a study was made entitled "Financial Distress Analysis Using the Altman Z-Score and Zmijewski Models to Predict Bankruptcy Case Study (Pt. Chandra Asri Pasific Tbk) 2019-2023 Period".

### 3. RESEARCH DESIGN

This research uses a qualitative approach with descriptive methods. Qualitative research. According to Hardani, et al (2020: 254) Qualitative research is a study that basically uses a deductive-inductive approach. Where this research is from a theoretical framework and the experience of researchers who are developed into problems and their solutions based on empirical data. Meanwhile, descriptive research aims to provide a systematic and accurate description of facts or events without the need to look for relationships between variables or test hypotheses. In this study what is used is secondary data. According to Ahmad, Muhammad Fachrurrazy, et al (2024: 64) secondary data is additional data obtained not from the first hand, but from the second, third and so on. The data used is in the form of the annual financial statements of the company PT. Chandra Asri Pacific Tbk for the period 2019-2023, which are available on the Indonesia Stock Exchange which can be downloaded from the website. Qualitative method is a data analysis technique that is carried out by collecting data based on the results of observations and applying it to the research findings. The data used in this study are available in the form of financial statements of PT Chandra Asri Pacific Tbk. will be listed on the Indonesia Stock Exchange from 2019 to 2023. The data analysis method used in this research is the *Altman Z-score* method and the *Zmijewski* method. This analysis is based on quantitative data.

### 4. RESULT AND DISCUSSION

#### 4.1 Altman Z-Score

The study uses the model (*Altman Z-Score* Modification) with classification according to Abadi & Misidawati, (2023: 38) as follows:

- a. If the Z-Score value  $> 2.6$ , it includes companies that are not experiencing financial distress or are in good health.
- b. If the value is  $1.1 < \text{Z-Score} < 2.6$  then it is a gray area (it cannot be determined whether the company is classified as healthy or experiencing financial distress).
- c. If the Z-Score value is  $< 1.1$ , it includes companies that are experiencing financial distress.

Table 1. Calculation Results of Altman Z-Score to Predict Bankruptcy

<b>Altman Z-Score Method</b>							
	<b>Coefficient</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Average</b>
<b>X1</b>	6.56	0.175	0.178	0.399	0.340	0.360	0.290
<b>X2</b>	3.26	0.259	0.263	0.199	0.169	0.137	0.206
<b>X3</b>	6.72	0.011	0.008	0.040	-0.036	-0.010	0.003
<b>X4</b>	1.05	1.042	1.016	1.417	1.325	1.142	1.189
<b>Z-Score</b>		<b>3.166</b>	<b>3.145</b>	<b>5.030</b>	<b>3.930</b>	<b>3.943</b>	<b>3.843</b>
<b>Description</b>		<b>Healthy</b>	<b>Healthy</b>	<b>Healthy</b>	<b>Healthy</b>	<b>Healthy</b>	<b>Healthy</b>

Source: Researcher (2024)

#### 1. Ratio (X1) *Working Capital to Total Assets*

The X1 value increased from 0.175 in 2019 to 0.399 in 2021, indicating an improvement in the company's working capital management. However, in 2022 and

2023, this value decreased slightly to 0.340 and 0.360, indicating pressure on the company's liquidity although it is still at a fairly good level. The increase in X1 in 2021 indicates efficiency in the use of current assets, but the downward trend thereafter indicates that the company needs to manage working capital better in order to optimally support asset growth

It can be concluded that the liquidity owned by the company is quite good against the total assets owned but needs to be maintained so that it does not continue to decline.

## **2. Ratio (X2) *Retained Earnings to Total Assets***

The X2 value shows a downward trend from 0.259 in 2019 to 0.137 in 2023, which means the company is allocating less and less retained earnings to increase its total assets. This decline could be a signal that the company is using more profit for operations or paying dividends rather than reinvesting. If retained earnings are getting smaller, the growth of total assets could be hampered due to the lack of reinvestment for business development and expansion of the company's assets

So it can be concluded that the smaller the company's retained earnings will have an impact on the growth of assets owned by the company.

## **3. Ratio (X3) *EBIT to Total Asset***

X3 experienced significant fluctuations, with low values of 0.011 in 2019 and 0.008 in 2020, then increased sharply to 0.040 in 2021, before dropping dramatically to -0.036 in 2022 and -0.010 in 2023. The sharp declines in 2022 and 2023 indicate that the company is under pressure to generate operating profit from its assets. If EBIT is negative, it is difficult for companies to increase assets through operating profitability, which could result in a decrease in asset efficiency and an increase in financial expenses

It can be concluded that the operational profitability owned by the company has decreased sharply, which shows the challenges in generating profits from the assets owned

## **4. Ratio (X4) *Book Value Of Equity to Book Value Of Total Debt***

The value of X4 is quite stable with an increase from 1.042 in 2019 to 1.417 in 2021, indicating that the company's equity is quite strong compared to its total debt. Although in 2022 and 2023 it fell to 1.325 and 1.142, this ratio remains above 1.0, indicating that the company still has a healthy capital structure. The stability of the X4 ratio indicates that the company still has enough equity to support asset growth, but the decline in the ratio in recent years indicates that the company needs to maintain a balance between debt and equity to maintain financial health

So the capital structure owned by the company is quite stable but the company needs to maintain a balance between equity and debt to support asset growth.

## **4.2 Zmijewski**

The Zmijewski Method analysis model has a classification according to Goh & Edition, (2023: 42) as follows:

- a. The company is said to be not bankrupt, if the *X-Score* value is less than 0.
- b. The company is unhealthy and potentially bankrupt if the *X-Score* value is more than 0.

Table 2. Calculation Results of the Zmijewski Method to Predict Bankruptcy

<b>Zmijewski Method</b>							
	<b>Coefficient</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Average</b>
	-4.30						
<b>X1</b>	-4.50	0.007	0.014	0.030	-0.030	-0.006	0.003
<b>X2</b>	5.70	0.490	0.496	0.414	0.430	0.467	0.459
<b>X3</b>	-0.004	1.772	1.739	3.141	3.754	3.472	2.776
<b>X-Score</b>		<b>-1.546</b>	<b>-1.545</b>	<b>-2.092</b>	<b>-1.722</b>	<b>-1.628</b>	<b>-1.707</b>
<b>Description</b>		<b>Not Bankrupt</b>	<b>Not Bankrupt</b>	<b>Not Bankrupt</b>	<b>Not Bankrupt</b>	<b>Not Bankrupt</b>	<b>Not Bankrupt</b>

Source: Researcher (2024)

### 1. Ratio (X1) Return On Assets

X1 shows the company's profitability in generating profits from its total assets. In 2019 to 2021, the value of X1 increased from 0.007 to 0.030, which indicates that the company began to show improvements in the use of its assets to generate profits. However, in 2022 and 2023, the value of X1 decreased to -0.030 and -0.006, which means the company is having difficulty maintaining its profitability. The significant decline in ROA in 2022 indicates that there is pressure on the company's profits, which could increase financial risk if not addressed immediately.

Based on the results of the calculation of the Zmijewski method, PT Chandra Asia Pasifik Tbk. the profitability of the company fluctuates with a downward trend in 2022-2023, which indicates that the company needs to increase efficiency in generating profits from its assets.

### 2. Ratio (X2) Debt Ratio

X2 measures the level of debt usage compared to the company's equity. In 2019 and 2020, the leverage ratio stabilized around 0.490 to 0.496, but decreased to 0.414 in 2021. In 2022 and 2023, the leverage ratio increased again to 0.430 and 0.467, indicating that the company still relies on debt to support its operational activities. The increase in the debt ratio in the last years could be a risk signal if the company is unable to manage its obligations well.

The company's debt ratio shows that the use of debt is still under control, although there is an increase in 2023 that needs to be watched out for.

### 3. Ratio (X3) Current Ratio

X3 measures a company's ability to meet its short-term obligations. This ratio shows a significant increase from 1.772 in 2019 to 3.754 in 2022, before declining slightly to 3.472 in 2023. The increase in the *Current Ratio* indicates that the company has good enough liquidity to pay its short-term obligations, so the risk of bankruptcy remains low.

So the *Current Ratio* owned by the company is in good condition, with a significant increase indicating that the company is still able to meet its short-term obligations.

## 4.3 Comparison of Financial Distress Analysis Results

After calculating the *financial distress* analysis using the Altman Z-Score and Zmijewski methods, the calculation results are obtained which will then be compared to get the best analysis in predicting bankruptcy at PT Chandra Asri Pasific Tbk. The following is a comparison between the Altman Z-Score and Zmijewski methods:



Table 3. Comparison of Financial Distress Analysis Results

Year \ Model	Almant Z-Score	Zmijewski
2019	Healthy	Not Bankrupt
2020	Healthy	Not Bankrupt
2021	Healthy	Not Bankrupt
2022	Healthy	Not Bankrupt
2023	Healthy	Not Bankrupt

Source: Researcher (2024)

The analysis results show that PT Chandra Asri Pasific Tbk is in a healthy condition based on the Altman Z-Score method, while the Zmijewski method indicates that the company is not experiencing bankruptcy. Although both result in a positive assessment, the approach and focus of the analysis used are different. Altman Z-Score evaluates a company's financial health by considering various ratios, including profitability, liquidity, and capital structure, thus providing a more comprehensive picture of the company's ability to survive in the long term. In contrast, the Zmijewski method focuses more on profitability and liquidity ratios, indicating that although the company is not in a bankrupt condition, there are challenges related to operational efficiency and debt management. Both methods imply that PT Chandra Asri Pasific Tbk has the potential to continue to grow, although it still needs to pay attention to certain aspects to maintain financial sustainability and stability.

The Altman Z-Score method is considered the most effective in measuring potential financial distress because it provides a more thorough analysis by considering various financial factors, including profitability, liquidity, and capital structure. By using various ratios, this method is able to describe the company's financial condition more completely and predict its ability to survive in the long term. The Altman Z-Score has also proven to be effective in predicting bankruptcy across industries and is backed by strong research. While the Zmijewski method still has value, its simpler approach does not capture all the important aspects of a company's financial condition.

## 5. CONCLUSION

Based on the calculations and analysis that have been carried out, it can be concluded as follows:

- a. Based on the results of the *Altman Z-Score* calculation from 2019 to 2023, PT Chandra Asri Pasific Tbk is in a healthy financial condition and is not experiencing financial distress. The company shows stable financial performance with a Z-Score value above the threshold, although there are slight fluctuations. This reflects the company's ability to manage risks and meet financial obligations.
- b. Based on the calculation results of the Zmijewski method from 2019 to 2023, the Company is not in bankruptcy, but the X-Score value that is consistently below the threshold indicates a less healthy financial condition. This indicates a potential risk that needs more attention.

### 5.1 Suggestions

Based on the above conclusions, several suggestions can be given which can be used as follows:

- a. PT Chandra Asri Pasific Tbk shows a healthy financial condition based on Altman Z-Score. The company is advised to continue to monitor financial performance with periodic evaluations of profitability, liquidity, and capital structure. Efforts to maintain and increase EBIT can be done with operational cost efficiency as well as product innovation and market expansion. The company also needs to utilize the positive development of EBIT to strengthen growth strategies and operational efficiency to ensure sustainable growth
- b. Based on Zmijewski's analysis, PT Chandra Asri Pasific Tbk is not experiencing bankruptcy, but there are financial health risks that need to be addressed. The company is advised to improve profitability and liquidity by optimizing the use of assets, reducing debt to reduce interest expenses, and increasing operational efficiency through innovation and cost reduction. These steps are important to improve financial condition, increase ROA, and reduce potential risks in the future.
- c. For the company PT Chandra Asri Pasific Tbk, it is recommended to use the Altman Z-Score method as the best analysis method to predict potential bankruptcy that occurs
- d. Future researchers are advised to add other bankruptcy prediction models, which can provide a more comprehensive perspective on the company's financial health.

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