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Predicting Financial Distress Using the Grover, Springate, Taffler, Zmijewski, and Altman models: a Case Study of PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL)

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ABSTRACT

Every company aims to remain competitive in the business world and consistently generate profits. Nevertheless, some companies that have operated for years are eventually forced to cease production due to mounting debt, poor management planning, and unstable financial statements, leading to financial distress—as seen in the cases of PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL). This research aims to determine which model among Grover (G-Score), Springate (S-Score), Taffler (T-Score), Zmijewski (X-Score), and Altman (Z-Score) is the most accurate in predicting financial distress. To evaluate the precision of each model, the study involves calculating the accuracy level of the prediction results. A comparative descriptive method with a quantitative approach is applied. The financial data analyzed in this study consists of the companies' financial statements from the three years following their declaration of bankruptcy or financial distress by the Commercial Court. The results indicate that the Springate model has the highest level of accuracy, achieving a 100% accuracy rate and successfully predicting the bankruptcy of the companies studied. It hopes that the company must having competent leaders by seeking the risk of bankruptcy / financial distress to help decisions or policies making, in order to save and prevent from threatening bankruptcy in the future.

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INTRODUCTION

In the business world, conditions and industries can change over time due to various global issues that have occurred and are still ongoing. Meanwhile, domestic

political turmoil and unstable economic growth have become a domino effect in determining future policies. Financial failure is a challenge that must also be faced, as experienced by PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL).

As cited from ipotnews.com (2024), the panel of judges at the Surabaya Commercial Court declared PT. Prima Alloy Steel Universal Tbk (PRAS) bankrupt in Case No. 63/Pdt.Sus-PKPU/2023/PN Niaga Sby on February 29, 2024. Due to the uncertainty regarding the company's business continuity, the Indonesia Stock Exchange decided to temporarily suspend the trading of PT. Prima Alloy Steel Universal Tbk (PRAS) securities on all markets starting from the first trading session on March 5, 2024, until further notice from the exchange. The shares of PT. Prima Alloy Steel Universal, with the stock code PRAS, were suspended at a price of IDR 97.

As cited from tempo.co (2024), the panel of judges at the Semarang Commercial Court declared PT Sri Rejeki Isman Tbk (SRIL) bankrupt in Case No. 2/Pdt.Sus-Homologasi/2024/PN Niaga Smg. Decision was issued by the Semarang Commercial Court and was upheld by the Supreme Court (MA) under case number 1345 K/PDT. SRIL shares were locked by the Indonesia Stock Exchange due to a delay in the payment of principal and interest on the sixth installment of the Sritex Phase III 2018 Medium Term Note (MTN).

PRAS and SRIL have ultimately recorded poor financial performance over the past few years. According to their financial reports, PRAS had liabilities amounting to IDR 1.193 trillion in 2023. Similarly, SRIL recorded liabilities of IDR 24.4 trillion in 2024

Several studies have been conducted to investigate the causes and reasons behind bankruptcy. Sam Ngwenya (2018) examined bankruptcy prediction in gold and platinum mining companies in South Africa, were found to be more financially distressed. Kang, James, & Fabian (2020) studied strategies to avoid the threat of bankruptcy. Dasgupta & Mason (2020) found that high interest rates have a significant impact on the potential for bankruptcy.

Based on this phenomenon, bankruptcy prediction is crucial for all organizations and companies, as it can have a significant impact on the economy. The potential for bankruptcy in any company raises concerns among various parties, both internally—such as managers and employees—and externally, such as investors and creditors.

These models have long been used by various parties as tools to assess the likelihood of a company's financial failure. These companies are operated in different industries but both face significant financial challenges making them interesting subjects for analysis using bankruptcy prediction models such as Grover, Springate, Taffler, Zmijewski, and Altman. Bankruptcy accuracy is a variable to measure how well the prediction results of a model reflect the actual financial reality of the company observed and the comparison between the model's prediction results and the actual conditions. The higher the accuracy of a model, the more accurate it is in measuring the bankruptcy prediction.

To determine whether the Grover (G-Score), Springate (S-Score), Taffler (T-Score), Zmijewski (X-Score), and Altman (Z-Score) models/ are accurate in predicting the bankruptcy level of PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL). Among these five models, which one is the most accurate in predicting the bankruptcy level of PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL).

LITERATURE REVIEWS

Financial Distress

Financial Distress is a condition of financial decline experienced by a company over several consecutive years, which can lead to bankruptcy (Platt and Platt, 2002). In general, there are four (4) categories of financial distress classification (Fahmi, 2013), namely.

a) Category A (very high and truly dangerous). This category indicates that the company may be declared bankrupt. It allows the company to report to the court that it is in a bankrupt position and to hand over management of various affairs to external parties.
b) Category B (high and considered dangerous). In this condition, the company must consider various solutions to safeguard its assets. This includes evaluating the potential impacts of decisions such as mergers and acquisitions. One visible impact in this situation is the termination of employment or early retirement for some employees.
c) Category C (moderate and considered that the company is still able to save itself). In this condition, the company must undertake a restructuring of various policies and management concepts. If necessary, the company should recruit highly competent experts to be placed in positions responsible for rescuing the company.
d) Category D (low). In this condition, the company is considered to be experiencing only temporary financial fluctuations caused by various internal and external factors. Usually, this condition is short-term and can be quickly resolved.

The stages of bankruptcy are outlined as follows (Kordestani et all , 2011):

a) *Latency*, return on assets will decrease significantly.
b) *Shortage of Cash*, the company does not have enough cash resources to meet current liabilities, although it may still have strong profitability.
c) *Financial distress*, the stage between bankruptcy and financial urgency. If a company cannot cure the symptoms of financial distress, it will inevitably go bankrupt.

Various analytical methods have been developed to predict the financial distress condition of a company.

Zmijewski (X-Score Model)

The evaluation criteria for the Zmijewski method state that if Z < 0.5, the company is considered healthy. The formula used in this study is as follows (Yoseph, 2011).

$$X = -4,3 - 4,5X1 + 5,7X2 + 0,004X3$$

Taffler (T-Score Model)

Taffler method assessment criteria if > 0.3 then the company is declared healthy. The model with the following formula (Karas dan Srbova, 2019).

$$T\text{-}Score = 0.53\ X1 + 0.13\ X2 + 0.18\ X3 + 0.16\ X4$$

Grover (G-Score Model)

The Grover method assessment criteria if G ≥ 0.01 produces the following function (Salimah and Yunita, 2019).

$$G = 1,650X1 + 3,404X2 - 0,01X3 + 0,057$$

Springate (S-Score Model)

The Springate method assessment criteria if the S score > 0.862 then the company is classified as healthy, formulated as follows (Yoseph, 2011).

$$S = 1,03X1 + 3,07X2 + 0,66X3 + 0,4X4$$

Altman (Z-Score Model)

The Springate method assessment criteria if the Z-Score > 2.99 then the company is classified as healthy, formulated as follows. (Yoseph, 2011).

$$Z = 1,2\ X1 + 31,4\ X2 + 3,3\ X3 + 0,6\ X4 + 1,0\ X5$$

Calculation of Prediction Result Accuracy Level

According to Han et al. (2012), the calculation of this level of accuracy aims to determine the most accurate model calculated using the following formula.

Accuracy Rate = Number of Correct Predictions / Number of Samples x 100%

In the grey area when predicting financial distress conditions, it is necessary to calculate the grey type. The grey type is a condition that indicates whether a company is in a bankruptcy-prone category or has the potential to go bankrupt. The grey level in each model is calculated using the following formula.

Grey Type = Number of Grey Predictions / Number of Samples x 100%

Meanwhile, to identify errors in predicting financial distress conditions, it is necessary to calculate the error type. The error type occurs when a sample that is actually experiencing distress is predicted not to experience distress, or vice versa, when the model predicts a sample to experience distress when in reality it does not experience distress (Fanny and Retnani, 2017). The error rate in each model is calculated using the following formula.

Error Type = Number of Error Predictions / Number of Samples x 100%

The following are the stages and steps taken to measure the level of accuracy (Sari & Yunita, 2019).

1. Calculating the value based on the bankruptcy prediction model.
2. The values obtained are then classified according to the cut-off point of each model.
3. The results will show whether the company is in a healthy or unhealthy condition.

Research Model

The research model explains the relationship between theory and the main factors that have been identified in a particular problem. Ratio measurements are carried out to analyze the potential for bankruptcy using the Zmijewski, Springate, Altman, Taffler, and Grover models.

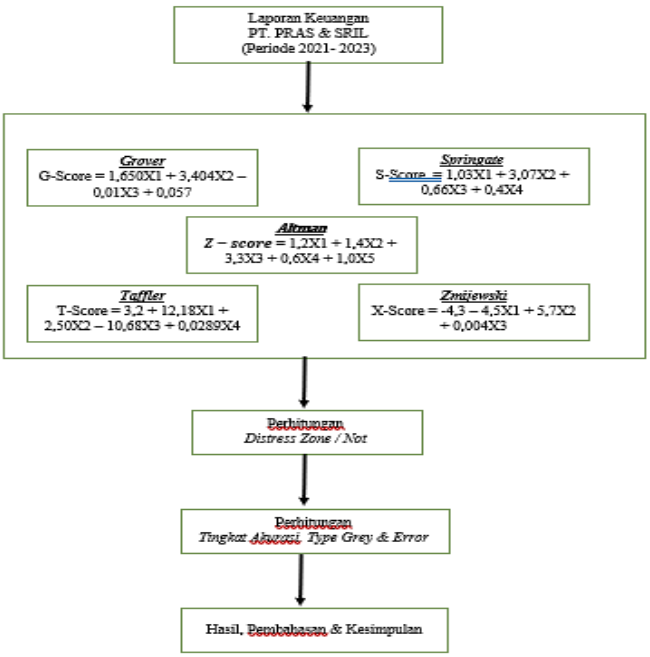

Figure 1. Research Model
Source: Data Processed, 2025

Previous Research

Sam Ngwenya (2018) studied the bankruptcy prediction of gold and platinum mining companies in South Africa, with variables of 5 (five) gold mining companies and 5 (five) platinum mining companies with Altman Z-Score. The results shows that gold mining companies were more financially stressed than platinum mining companies.

Fauzi, *et. al*. (2020) studied about *The Accuracy of the Altman, Ohlson, Springate and Zmejewski Models in Bankruptcy Predicting Trade Sector Companies in Indonesia.*. These findings shows that the most accurate model for analyzing the bankruptcy rate of stock sector companies in Indonesia is the Springate and Altman model.

METHOD

This study uses a quantitative approach with a comparative descriptive method. This method has several uses, including:

1) To compare existing theories with practices that occur in the field to determine the potential for corporate bankruptcy using the Grover, Springate, Taffler, Zmijewski, and Altman models.
2) The type of data used in this study is quantitative data, in the form of the company's financial statements for three years after being declared bankrupt by the Commercial Court in 2024. The data sources used come from external secondary data

Research Location & Place

In this study, the objects studied are two companies, namely PT. Prima Alloy Steel Universal Tbk (PRAS) dan PT. Sri Rejeki Isman Tbk (SRIL) in Bursa Efek Indonesia.

Data Collection Methods

The data collection method in this study was carried out in two stages, including.

1. The first stage is through literature study, namely by examining journals and books that are relevant to the problems being studied.
2. The second stage is carried out through documentation study, in the form of financial reports of PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL) which are listed on the Indonesia Stock Exchange.

Research Population & Sample

According to Sugiyono (2007:72), population is a generalization area consisting of objects or subjects with certain characteristics and qualities determined by researchers to be studied and analyzed in order to obtain conclusions. The population used includes all companies declared bankrupt on the Indonesia Stock Exchange in 2024.

Sample is a part of the population that has certain characteristics (Sugiyono, 2007:55). The sample used in two companies, with financial report data for three years before the company was declared bankrupt on the Indonesia Stock Exchange, as shown in Table 1.

Tabel 1. Bankrupt Companies on the Indonesia Stock Exchange in 2024

No	Company Name & Shared Codes Kode Saham	Bankruptcy Determination	Sample 3 Years Before Declared Bankrupt
1	PT. Prima Alloy Steel Universal Tbk (PRAS)	February 29th, 2024	a) 2021 (Quarter IV) b) 2022 (Quarter IV) c) 2023 (Quarter III)
2	PT. Sri Rejeki Isman Tbk (SRIL)	October 24th, 2024	a) 2022 (Quarter IV) b) 2023 (Quarter IV) c) 2024 (Quarter III)

Source: Indonesia Stock Exchange, 2025

Data Analysis

Data analysis is the process of processing collected data for subsequent interpretation. This process includes grouping the data based on each variable studied as well as performing calculations to test the proposed research model, which consist of the company's financial data for three years declaration of bankruptcy by the Commercial Court in 2024. The data is analyzed in greater depth using various bankruptcy prediction models, namely the Grover (G-Score Model), Springate (S-Score Model), Taffler (T-Score Model), Zmijewski (X-Score Model), and Altman (Z-Score Model).

Research Instrument

The research instruments used include the below:

1. Data Collection
2. Data Presentation
3. Conclusion Drawing

RESULT AND DISCUSSION

Results

Table 2. Interpretation Result, Model Zmijewski (*X-Score)*

Year	Zmijewski X- Score	*Cut-Off*	STATUS	Code
2021	**-0.29**	X < 0,5	**SAFE**	PRAS
2022	**0.22**	X < 0,5	**SAFE**	PRAS
2023	**1.00**	X > 0,5	**DISTRESS**	PRAS
2022	**9.56**	**X > 0,5**	**DISTRESS**	SRIL
2023	**11.01**	**X > 0,5**	**DISTRESS**	SRIL
2024	**11.70**	**X > 0,5**	**DISTRESS**	SRIL

Source: Data Processed, 2025

Table 2 shows that over the past three years, the company has been in an unhealthy condition or at risk of bankruptcy. Based on the Zmijewski (X-Score) calculations, PRAS in 2023 and SRIL in 2022–2024 are classified as being in a state of distress, while PRAS during the 2021–2022 period falls into the safe category.

Table 3. Interpretation Result, Model Taffler (T-Score)

Year	Taffler T- Score	Cut-Off	STATUS	Code
2021	**0.29**	**0,2 ≤ T ≤ 0,3**	**GREY**	PRAS
2022	**0.05**	**T < 0,2**	**DISTRESS**	PRAS
2023	**-0.41**	**T < 0,2**	**DISTRESS**	PRAS
2022	**-1.01**	**T < 0,2**	**DISTRESS**	SRIL
2023	**-0.37**	**T < 0,2**	**DISTRESS**	SRIL
2024	**0.00**	**T < 0,2**	**DISTRESS**	SRIL

Source: Data Processed, 2025

Table 3 shows that over the past three years, the company has been in an unhealthy condition or at risk of bankruptcy (distress). Based on the Taffler (T-Score) calculations, PRAS in 2022–2023 and SRIL in 2022–2024 are classified as being in a state of distress, while PRAS in 2021 falls into the grey zone category.

Table 4. Interpretation Result, Model Grover (G-Score)

Year	Grover G- Score	Cut-Off	STATUS	Code
2021	**0.27**	G ≥ 0,01	**SAFE**	PRAS
2022	**0.00**	-0,02 < G < 0,01	**GREY**	PRAS
2023	**-0.37**	G ≤ 0,02	**DISTRESS**	PRAS
2022	**-0.90**	G ≤ 0,02	**DISTRESS**	SRIL
2023	**-0.52**	G ≤ 0,02	**DISTRESS**	SRIL
2024	**-0.22**	G ≤ 0,02	**DISTRESS**	SRIL

Source: Data Processed, 2025

Table 4 shows that over the past three years, namely PRAS in 2023 and SRIL in 2022 to 2024, are in an unhealthy condition or at risk of bankruptcy (distress). Meanwhile, PRAS in 2022 is in the GREY category, indicating the need for special attention. As for 2021, PRAS is in a healthy condition.

Table 5. Interpretation Result, Model *Springate (S-Score)*

Year	Grover G-*Score*	*Cut-Off*	STATUS	Code
2021	**0.19**	S < 0,862	**DISTRESS**	PRAS
2022	**-0.24**	S < 0,862	**DISTRESS**	PRAS
2023	**-1.08**	S < 0,862	**DISTRESS**	PRAS
2022	**-2.93**	S < 0,862	**DISTRESS**	SRIL
2023	**-1.38**	S < 0,862	**DISTRESS**	SRIL
2024	**-0.47**	S < 0,862	**DISTRESS**	SRIL

Source: Data Processed, 2025

Table 5 shows that over the past three years, the company has been in an unhealthy condition or at risk of bankruptcy (distress). The S-Score figures obtained during those years indicate values well below the cut-off point of 0.862, suggesting that the company was indicated to be experiencing bankruptcy during that period.

Table 6. Interpretation Result, Model Altman (Z-Score)

Year	Altman (Z-Score)	Cut-Off	STATUS	Code
2021	9.58	Z > 2,99	**SAFE**	PRAS
2022	5.20	Z > 2,99	**SAFE**	PRAS
2023	3.04	Z > 2,99	**SAFE**	PRAS
2022	9.34	Z > 2,99	**SAFE**	SRIL
2023	9.25	Z > 2,99	**SAFE**	SRIL
2024	9.36	Z > 2,99	**SAFE**	SRIL

Source: Data Processed, 2025

Table 6 shows that during the last three years, the issuer codes PRAS and SRIL are in a condition free from financial distress. The Z-Score value is still far below the Cut-Off limit, which is 1.8.

Table 7. Comparison of Accuracy Level Results of Bankruptcy Models

Bankruptcy Model	Accuracy Level			Total
	Correct (%)	Error Type (%)	*Grey Area (%)*	
Grover (G-Score)	66.67	16.67	16.67	6
Springate (S-Score)	100.00	00.00	00.00	6
Taffler (T-Score)	83.33	00.00	16.67	6
Zmijewski (X-Score)	66.67	33.33	00.00	6
Altman (Z-Score)	0.00	100.00	00.00	6

Source: Data Processed, 2025

Table 7 concludes that Grover (G-Score), Springate (S-Score), Taffler (T-Score), Zmijewski (X-Score), and Altman (Z-Score) models produce bankruptcy prediction values and varying levels of accuracy for the PRAS and SRIL issuer codes.

The Grover model identifies that there are 4 (four) samples experiencing financial distress, 1 (one) sample in a safe condition, and 1 (one) sample in the Grey Area, which is a condition of doubt regarding the possibility of bankruptcy. Thus, this model has an accuracy rate of 66.67%, while the error rate and grey area are 16.67%.

The Springate model found that there were 6 (six) samples experiencing financial distress. Thus, this model has an accuracy rate of 100.00%.

The Taffler model found that there were 5 (five) samples experiencing financial distress conditions, and 1 (one) sample experiencing Grey Area conditions or doubts about bankruptcy. Thus, this model has an accuracy rate of 83.33% and a grey area type of 16.67%.

The Zmijewski model found that there were 4 (four) samples experiencing financial distress, and 2 (two) samples did not experience financial distress or were in a Safe condition. With the percentage value showing, this model has an accuracy rate of 66.67% and an error rate of 33.33%.

The Altman model found that there were 6 (six) samples experiencing financial distress. Thus, this model has an error type of 100%.

Discussion

The results of the comparison of the level of bankruptcy prediction accuracy in PRAS and SRIL companies shows that the Springate model has the highest accuracy, reaching 100%. This indicates that the Springate model is able to predict the bankruptcy of companies with a very good level of accuracy cut-off value in this model being S <0.862. In addition, the results are in line with the theory put forward by Fauzi et al. (2020), which states the Springate S-Score model can predict the potential for company bankruptcy through the Multiple Discriminant Analysis (MDA) method, which relies on financial ratios in its calculations.

The Comparison of prediction error types in PRAS & SRIL companies shows that the highest level of accuracy is obtained in the Altman model with an accuracy level of 100%, which should be financial distress but is identified in a Safe condition or safe zone. The model used by the researcher failed to get the right bankruptcy prediction according to reality.

The difference results between the Springate and Altman models could be caused by several factors, namely:

1. Formula Characteristics Differences
   a) The Springate model focuses on short-term profitability and liquidity ratios. If a company experiences operational losses, even though it still has large assets, this model can still detect potential bankruptcy.
   b) The Springate model is more effective in assessing short-term financial health. If a company experiences liquidity problems or a short-term decline in profits, this model can more quickly identify the risk of bankruptcy.

Possible reasons why the issuer codes SRIL and PRAS are categorized as bankrupt by the Springate model include: low profitability levels, liquidity disruptions due to minimal working capital, and inefficient asset turnover, which indicate problems in the company's operations. If net income is low or negative, the Springate model can more quickly identify potential bankruptcy, even though the company has high-value assets and large equity market capitalization.

c) The Altman model is more tolerant of low profitability values. This model has a wider scope because it considers long-term solvency and capital structure. If the company has a strong market value of equity or sufficient assets to cover its debts, this model can show that the company is "not bankrupt" even though profits show a decline.

Some possible reasons why Altman considers the issuer code SRIL & PRAS not bankrupt include: (1) The asset value is greater than the debt value, and (2) The equity market value is strong enough, so that Altman does not immediately consider the company bankrupt. If the equity and assets are still large, Altman can still provide a "not bankrupt" assessment result, even though the company is experiencing profit pressure.

2. Companies Characteristic

a) Prima Alloy Steel Universal Tbk (PRAS) – Steel Industry
   - Low liquidity, indicating that the steel industry requires large investments in inventory and fixed assets.
   - Declining profitability, indicated by raw material prices and tight competition.
   - Large equity value so that the Altman model still provides "non-bankrupt" results.

Looking at the characteristics of PRAS shows that the Springate model focuses more on short-term profitability, while the Altman model considers the value of equity and assets in the long term.

b) PT. Sri Rejeki Isman Tbk (SRIL) – Textile Industry
   - SRIL is experiencing profitability pressure due to high raw material prices and declining demand.
   - Working capital is low every year, indicating liquidity difficulties.
   - Total equity is still quite large, so Altman does not immediately classify the results as bankrupt.

The characteristics of SRIL shows that the Springate model is quicker to detect the risk of bankruptcy due to poor profitability values, while the Altman model still sees equity as the company's mainstay.

The results of the comparison of the grey area / vulnerable in the PRAS & SRIL companies show that the level of accuracy obtained in the Grover & Taffler model is 16.67%, indicating the Grey Zone / Vulnerable value in the PRAS issuer code. The total current asset position in 2021 was Rp. 439,674,241,950 or contributed 14.49% to total assets. It states that the Taffler model has not able to accurately predict corporate bankruptcy due to financial variables that generate uncertainty. In addition, these results are also consistent with the theory put forward by Iswahyudi (2022), states Grover model is less sensitive in predicting bankruptcy because it focuses on the comparison between working capital and profit.

The bankruptcy prediction model is "a signaling" for companies to be more vigilant in facing the worst possibilities. In addition, the prediction results from the model can be used as evaluation material to improve the company's performance in the future. The prediction results with various bankruptcy methods indicate that not all methods can be applied equally in every condition and situation. In addition, various ratio components do not always produce significant differences. If a company experiences bad conditions in various aspects, then it is likely that the bankruptcy prediction method will show similar results.

In predicting corporate bankruptcy is not only internal factors must be considered, but external factors also play a role in determining the condition, situation, and performance of the company such as economic, political, and competitive aspects. Therefore, various bankruptcy prediction methods currently available have not been able to provide completely accurate results in predicting the bankruptcy of a company.

CONCLUSION

The Grover model found potential bankruptcy in PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL) has an accuracy level of 66.67%. The Springate model found potential bankruptcy in PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL) has an accuracy level of 100.00%. The Taffler model found potential bankruptcy in PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL) has an accuracy level of 83.33%. The Zmijewski model found potential bankruptcy in PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL) has an accuracy level of 66.67%. The Altman model found potential bankruptcy in PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL) has an accuracy level of 00.00%. The Springate (S-Score) model has proven to be the most accurate model in predicting bankruptcy at PT. Prima Alloy Steel Universal Tbk (PRAS) and PT. Sri Rejeki Isman Tbk (SRIL), with an accuracy level reaching 100.00%.

For the Company, even though the company has been declared bankrupt, management is expected to actively cooperate with the curator and related parties in the process of settling obligations to creditors. Neat documentation, openness of information, and transparency are very important to facilitate the liquidation process and minimize losses to interested parties. For Creditors & Investors, creditors and investors are expected to conduct a thorough evaluation of the company's financial risk before making investment decisions or providing credit. Prediction models such *Grover (G-Score), Springate (S-Score), Taffler (T-Score), Zmijewski (X-Score) and Altman (Z-Score)* and others can be used as early analysis tools to reduce potential losses. For the Government & Regulators, it is expected to strengthen the regulation of supervision of public companies, especially in terms of financial information disclosure. Education and stricter supervision of financial reports can be a preventive measure to detect potential bankruptcy early. For further researchers, it is recommended to explore this problem by applying other methods or using more than five financial distress prediction models as a comparison or reference in estimating the possibility of financial distress. In addition, future research can also expand the research object, not only limited to other companies listed on the Indonesia Stock Exchange, by consider adding a time period so that the number of samples increases and the research results become more diverse and also add external variables such as macroeconomic conditions or managerial factors, so that the bankruptcy prediction model is more accurate and applicable.

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