



Financial Distress Analysis of Raw Material Companies at Risk of Delisting on the Indonesia Stock Exchange

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Article History:

Received : 05-08-2026

Revised : 19-09-2026

Accepted : 23-09-2026

Keywords: *Bankruptcy Prediction, Capital Market, Delisting Risk, Financial Distress, Financial Ratio*

Abstract: *Financial distress is a condition that needs to be detected early because it can increase the risk of delisting and reduce investor confidence. Raw materials companies are characterized by high capital requirements, making them more vulnerable to financial stress. This study aims to analyze the financial distress conditions of raw materials companies at risk of delisting on the Indonesia Stock Exchange and compare the accuracy levels of the Altman Z-Score, Zmijewski, and Springate methods. This study uses a quantitative approach with descriptive methods. The study population consisted of 13 raw materials companies with the potential for delisting, while the sample was determined using a purposive sampling technique, resulting in five companies for the 2020-2024 period. The research data consisted of secondary financial reports collected through documentation techniques and literature studies. Data analysis was performed using the Altman Z-Score, Zmijewski, and Springate models, along with calculations of accuracy and error type. The results show that the Altman Z-Score method classified three companies as experiencing financial distress, the Zmijewski method produced a more dynamic classification, while the Springate method identified almost all companies as experiencing financial distress. The research conclusion shows that the Altman Z-Score method has the highest average accuracy rate of 80%, making it the most suitable method for detecting financial distress in raw material sector companies at risk of delisting.*

How to Cite: Lilis Mardiana, Divianto, Agung Anggoro Seto. (2026). *Financial Distress Analysis of Raw Material Companies at Risk of Delisting on the Indonesia Stock Exchange*. 4(2). pp.1063-1072. <https://doi.org/10.61536/escalate.v4i02.638>



<https://doi.org/10.61536/escalate.v4i02.638>

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Introduction

The Indonesian economy continues to demonstrate resilience amid global uncertainty, with consistent growth above 5%, supported by domestic consumption and post-pandemic macroeconomic stabilization (World Bank, 2025). Economic growth in 2026 is also projected to be in the range of 4.9% to 5.7% (Bank Indonesia, 2026). These conditions have driven increasingly fierce business competition, requiring companies to secure funding to maintain their competitiveness, one of which is through the capital market. Through Initial Public Offerings (IPOs), companies obtain capital, while investors gain investment opportunities with high profit potential and liquidity (Sinurat et al., 2022; Brights, 2024; Idx, 2018).

In addition to IPOs, the Indonesia Stock Exchange also implements delisting for companies that no longer meet listing requirements, such as experiencing ongoing losses, failing to meet reporting obligations, or facing issues that threaten business continuity (IDX, 2024). The Indonesia Stock Exchange recorded 70 companies at risk of delisting, including companies in the raw materials sector (Indo Primer, 2025). This sector has high capital requirements and operating costs, making it more vulnerable to financial pressure and distress (Investopedia, 2026).

Financial distress is characterized by a company's declining ability to meet obligations and generate profits (Rori et al., 2025). Based on financial reports for the 2020–2024 period, several raw materials companies showed increasing DER and DAR ratios, such as PT FASW, while PT ALMI and PT PURE recorded negative values due to negative equity. These conditions indicate a growing risk of corporate financial distress.

Indications of financial distress are also evident in profitability ratios. ROA and ROE data show that PT SMCB has relatively stable performance, while PT FASW experienced a sharp decline in 2024. PT ALMI and PT PURE also recorded negative profitability, indicating the company's weak ability to generate profits. Therefore, financial statement analysis is necessary to detect financial distress early (Thian, 2022).

Various studies have used the Altman Z-Score, Zmijewski, and Springate methods to predict financial distress, but they have yielded varying levels of accuracy. Khasanah (2024), Mustakim (2025), Saputra and Arisyah (2021), and Hendiansyah (2025) indicate that there is no consensus on the most accurate method. Therefore, this study aims to analyze financial distress in raw material sector companies with potential delisting on the Indonesia Stock Exchange using the Altman Z-Score, Zmijewski, and Springate methods and compare their accuracy levels. This research is important for early detection for companies and investors, with a novelty in that it focuses on raw material sector companies with potential delisting during different research periods.

Method

This study uses a quantitative approach with quantitative descriptive methods to analyze the financial distress of raw materials companies facing potential delisting on the Indonesia Stock Exchange (IDX). Data were statistically analyzed to address the research objectives, following a quantitative approach based on the positivist paradigm (Sugiyono, 2022).

The research data consists of secondary quantitative data obtained from company financial reports on the official Indonesia Stock Exchange website and company websites. Data collection was conducted using documentation and literature review techniques (Abubakar, 2021; Sugiyono, 2022). Analysis was conducted using the Altman Z-Score method (Ginting & Wardayani, 2022), Zmijewski (Raharjo, 2023), and Springate (Pelitawati et al., 2020) to classify each company's financial distress status.

The study population consisted of 13 raw materials companies with the potential for delisting on the Indonesia Stock Exchange (Sugiyono, 2022). The sample was selected using a purposive sampling technique based on the criteria of companies that published financial reports for the 2020–2024 period and had problematic financial statements (Sugiyono, 2022; Rasyid, 2022). Based on these criteria, five companies were selected as research samples: FASW, LMSH, SMCB, ALMI, and PURE.

The research procedures include problem identification, literature study, determination of research methods, collection of financial report data for the 2020–2024 period, data processing using the Altman Z-Score, Zmijewski, and Springate methods, and analysis of the results to determine financial distress conditions and compare the accuracy levels of the three methods.



Results and Discussion

Altman Z-score method

Table 1 Altman Z-Score Method Calculation

Code	Year	X1	X2	X3	X4	X5	Z-Score	Category
FASW	2020	-0.057	0.193	0.031	2,502	0.687	15,707	ND
	2021	-0.066	0.201	0.046	2,303	0.897	14,719	ND
	2022	-0.140	0.194	0.009	1,921	0.846	12,376	ND
	2023	-0.264	0.145	-0.050	1,764	0.616	11,198	ND
	2024	-0.330	0.056	-0.087	1,291	0.608	8,354	ND
LSMH	2020	0.395	0.687	-0.056	0.847	0.870	0.887	FD
	2021	0.458	0.727	0.045	2,184	1,159	1,189	FD
	2022	0.486	0.769	-0.036	3,042	1,306	1,342	FD
	2023	0.464	0.759	-0.046	1,034	0.903	0.924	FD
	2024	0.457	0.740	-0.063	1,732	0.769	0.793	FD
SMCB	2020	0.004	0.065	0.079	640	0.487	4,331	ND
	2021	0.062	0.090	0.072	1,355	0.522	8,655	ND
	2022	0.010	0.120	0.068	1,393	0.574	8,935	ND
	2023	0.026	0.144	0.066	1,650	0.557	10,462	ND
	2024	0.011	0.175	0.059	826	0.562	5,524	ND
ALMI	2020	-0.345	-1,187	-0.093	0.088	0.672	0.649	FD
	2021	0.183	-1,279	0.010	1,150	1,091	1,083	FD
	2022	0.124	-1,674	-0.039	1,785	1,097	1,084	FD
	2023	-0.078	-2,337	-0.142	1,657	0.990	0.962	FD
	2024	-0.369	-5,350	-0.180	0.873	0.659	0.579	FD
PURE	2020	-0.547	0.196	-0.137	0.572	0.196	0.191	FD
	2021	-0.599	0.301	-0.008	0.178	0.023	0.021	FD
	2022	-0.720	0.405	-0.043	0.096	0.014	0.011	FD
	2023	-0.825	0.519	-0.026	0.085	0.030	0.027	FD
	2024	-0.758	0.279	-0.006	0.081	0.079	0.074	FD

Based on Table 1, providing the results of the Altman z-score method for the five companies, namely FASW and SMCB, shows that the companies are consistently in the non-distress category from 2020-2024, while LSMH, ALMI, and PURE from the 2020-2024 period show that they are in the financial distress category.

Zmijewski Method

Table 2 Zmijewski Method Calculation

Code	Year	X1	X2	X3	X-Score	Category
FASW	2020	0.031	0.602	0.809	-1,010	ND
	2021	0.046	0.615	0.828	-1,008	ND
	2022	0.009	0.611	0.656	-0.863	ND
	2023	-0.050	0.652	0.470	-0.360	ND
	2024	-0.087	0.738	0.415	0.296	FD
LSMH	2020	-0.056	0.245	3,436	-2,665	ND
	2021	0.045	0.206	4,504	-3,348	ND
	2022	-0.036	0.157	6,286	-3,267	ND
	2023	-0.046	0.163	5,225	-3,183	ND
	2024	-0.063	0.178	4,780	-3,023	ND
SMCB	2020	0.031	0.635	1,018	-0.825	ND
	2021	0.033	0.479	1,343	-1,725	ND

ALMI	2022	0.039	0.445	1,043	-1,943	ND
	2023	0.040	0.437	1,104	-1,995	ND
	2024	0.035	0.386	1,054	-2,261	ND
	2020	-0.187	1,189	6,037	3,293	FD
	2021	0.000	0.609	1,033	-0.837	ND
	2022	-0.043	0.544	1,734	-1,013	ND
	2020	-0.142	0.912	0.363	1,539	FD
	2021	-0.102	0.982	0.351	1,753	FD
	2022	-0.100	1,082	0.301	2,315	FD
	2023	-0.123	1,203	0.279	3,109	FD
PURE	2024	-0.008	1,180	0.326	2,463	FD

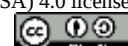
Table 2 The Zmijewski method analysis results for LMSH and SMCB, which were in the non-distress category from 2020 to 2024. FASW experienced financial distress in 2024, ALMI was in the financial distress category in 2020 and 2024, and in 2021 to 2023, the company was in the non-distress category. Meanwhile, PURE consistently remained in the financial distress category.

Springate Method

Table 3 Springate Method Calculation

Code	Year	A	B	C	D	S-Score	Category
FASW	2020	-0.057	0.031	0.106	0.687	0.381	FD
	2021	-0.066	0.046	0.163	0.897	0.541	FD
	2022	-0.140	0.009	0.032	0.846	0.244	FD
	2023	-0.264	-0.050	-0.127	0.616	-0.263	FD
	2024	-0.330	-0.087	-0.194	0.608	-0.492	FD
LMSH	2020	0.395	-0.056	-0.322	0.870	0.370	FD
	2021	0.458	0.045	0.313	1,159	1,280	ND
	2022	0.486	-0.036	-0.369	1,306	0.669	FD
	2023	0.464	-0.046	-0.446	0.903	0.403	FD
	2024	0.457	-0.063	-0.539	0.769	0.229	FD
SMCB	2020	0.004	0.079	0.236	0.487	0.598	FD
	2021	0.062	0.072	0.279	0.522	0.677	FD
	2022	0.010	0.068	0.241	0.574	0.606	FD
	2023	0.026	0.066	0.223	0.557	0.600	FD
	2024	0.011	0.059	0.228	0.562	0.569	FD
ALMI	2020	-0.345	-0.093	-0.185	0.672	-0.493	FD
	2021	0.183	0.010	-0.105	1,091	0.585	FD
	2022	0.124	-0.039	-0.103	1,097	0.378	FD
	2023	-0.078	-0.142	-0.318	0.990	-0.330	FD
	2024	-0.369	-0.180	-0.538	0.659	-1,023	FD
PURE	2020	-0.547	-0.137	-0.191	0.196	-1,031	FD
	2021	-0.599	-0.008	-0.129	0.023	-0.719	FD
	2022	-0.720	-0.043	-0.115	0.014	-0.941	FD
	2023	-0.825	-0.026	-0.128	0.030	-1,002	FD
	2024	-0.758	-0.006	-0.007	0.079	-0.771	FD

Table 3 The Springate method shows the results of calculations for FASW, SMCB, ALMI, and PURE, which were consistently in the financial distress category from 2020 to 2024. In 2021, they were classified as non-distress, while in 2020, 2022, 2023, and 2024, LMSH was in the financial distress category.



Financial Distress Analysis Recapitulation Results

Table 4 Summary of Results

Code	Year	Altman	Zmijewski	Springate
FASW	2020	ND	ND	FD
	2021	ND	ND	FD
	2022	ND	ND	FD
	2023	ND	ND	FD
	2024	ND	FD	FD
LMSH	2020	FD	ND	FD
	2021	FD	ND	ND
	2022	FD	ND	FD
	2023	FD	ND	FD
	2024	FD	ND	FD
SMCB	2020	ND	ND	FD
	2021	ND	ND	FD
	2022	ND	ND	FD
	2023	ND	ND	FD
	2024	ND	ND	FD
ALMI	2020	FD	FD	FD
	2021	FD	ND	FD
	2022	FD	ND	FD
	2023	FD	ND	FD
	2024	FD	FD	FD
PURE	2020	FD	FD	FD
	2021	FD	FD	FD
	2022	FD	FD	FD
	2023	FD	FD	FD
	2024	FD	FD	FD

Based on table 4 This is a summary of the results of the financial distress analysis conducted using the three methods. After that, compare the summary of the results of the financial distress analysis.

Comparison of Summary of Financial Distress Analysis Results

Table 5 Comparison of Financial Distress Analysis Results

No	Analysis Method	Year	Analysis Results			Total
			Financial Distress	Gray Area	Non-Distress	
1	Altman Z-Score	2020	3	-	2	5
		2021	3	-	2	5
		2022	3	-	2	5
		2023	3	-	2	5
		2024	3	-	2	5
2	Zmijewski	2020	2	-	3	5
		2021	1	-	4	5
		2022	1	-	4	5
		2023	1	-	4	5
		2024	3	-	2	5
3	Springate	2020	5	-	-	5
		2021	4	-	1	5

2022	5	-	-	5
2023	5	-	-	5
2024	5	-	-	5

Accuracy Level Calculation

Table 6 Calculation of Accuracy Level and Error Type

No	Analysis Method	Year	Accuracy Level	Error type level
1	Altman Z-Score	2020	80%	20%
		2021	60%	40%
		2022	100%	0%
		2023	80%	20%
		2024	80%	20%
2	Zmijewski	2020	100%	0%
		2021	100%	0%
		2022	60%	40%
		2023	40%	60%
		2024	80%	20%
3	Springate	2020	40%	60%
		2021	40%	60%
		2022	60%	40%
		2023	80%	20%
		2024	80%	20%

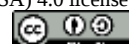
Table 6 shows that the Altman Z-Score and Zmijewski methods have the highest accuracy level of 100%, while the Springate method has the highest accuracy level with a score of 80% and an error type level of 20%.

Average Accuracy Level Analysis

Table 7 Average Accuracy Level and Error Type

No	Analysis Method	Year	Average Accuracy Rate	Average Error Rate type
1	Altman Z-Score	2020	80%	20%
		2021		
		2022		
		2023		
		2024		
2	Zmijewski	2020	76%	24%
		2021		
		2022		
		2023		
		2024		
3	Springate	2020	60%	40%
		2021		
		2022		
		2023		
		2024		

Table 7 shows that the Altman Z-Score method has the highest average accuracy rate of 80% with the lowest average error type rate of 20%, the Zmijewski method is in second place with an average accuracy rate of 76% with an error type of 24%, while the Springate method has the lowest average accuracy rate of the three methods, namely 60% with an error type rate of 40%.



Discussion

Based on financial distress analysis calculations for five raw materials companies with potential delisting on the Indonesia Stock Exchange (IDX) between 2020 and 2024, each analysis method yields different prediction levels. This difference is due to the different financial ratio components used in each method.

The Altman z-score method focuses on a company's profitability, liquidity, activity, and equity. The Zmijewski method emphasizes profitability, leverage, and liquidity, while the Springate method focuses on a company's profitability relative to its current liabilities. The differences in calculation components between these methods result in differences in financial distress among companies.

1. Altman Z-Score Method Analysis of Financial Distress

The results of the study using the Altman z-score method approach to five raw material sector companies that have the potential for delisting, namely FASW and SMCB, are in the non-distress category in the 2020-2024 period. This means that the company still has good capabilities in financial performance as seen from the z-score calculation per period which has a variable value of X4 with a better value than other companies, which means that the company's equity can meet total liabilities so that the company is not in a state of financial distress, this is in line with a previous study conducted by Hidayah, et al. (2024).

The FASW shows a declining z-score, indicating a decline in financial performance due to a decrease in profitability and working capital. However, the z-score remains in the non-distress category. FASW remains in the non-distress category due to supportive economic factors, such as relatively stable demand in the paper industry, which reduces the risk of financial distress (Pasar Dana, 2023).

LMSH, ALMI, and PURE consistently fell into the financial distress category from 2020 to 2024. This indicates the company is experiencing financial difficulties due to the large total liabilities compared to its ability to generate profits, manage assets, and manage working capital. This finding aligns with findings by Resfitasari et al. (2021).

2. Zmijewski Method Analysis of Financial Distress

Based on the findings of this study using the Zmijewski method, it was found that companies were in the financial distress and non-distress categories. LMSH and SMCB were consistently in the non-distress category from 2020 to 2024. This indicates that both companies still have adequate leverage and liquidity, enabling them to maintain their financial condition (Ayem and Anastasia, 2024).

Meanwhile, the FASW method underwent a change, indicating financial difficulties due to declining profitability. Meanwhile, ALMI experienced financial distress in 2020 and 2024 and managed to transition to the non-distress category in 2021-2023, indicating an improvement in its financial performance. This improvement was driven by increased operational efficiency, an improved capital structure, and reduced loss pressure. However, in 2024, ALMI returned to the financial distress category.

PURE has consistently been in financial distress due to its high debt ratio and declining profits. This is due to limited material availability and relatively high material prices. Furthermore, the impact of the global economy has resulted in changes in raw material prices and increased distribution costs, which have squeezed the company's profit margins (PT Trinitan Metals & Minerals, 2023).

3. Springate Method Analysis of Financial Distress

Based on research conducted using the Springate method, LMSH was found to be in the non-distress category in 2021, while in other years it was in the financial distress category. This indicates that LMSH experienced unstable financial performance in the 2020-2024 period due to declining sales, which weakened profitability and reduced the company's profit-generating capacity. This decline resulted in the Springate method ratio resulting in a score in the financial distress category, a statement supported by previous research conducted by Cahyani and Nugraeni (2024).

Furthermore, FASW, SMCB, ALMI, and PURE remained classified as financial distress during the 2020-2024 period. This condition indicates that these companies were unable to achieve

profitable EBIT and EBT and experienced a decline in revenue. This finding is consistent with research conducted by Lawrence et al. (2024) and Zulhelmi et al. (2025).

4. Analysis of Accuracy Level and Error Type

The results of the research indicate that the method with the highest level of accuracy is the Altman z-score method, with an accuracy rate of 80% and a type error rate of 20%. These results indicate that the Altman z-score method has good consistency in estimating financial distress in the raw materials sector. This high level of accuracy is due to the Altman z-score method using several financial ratios that describe the company's liquidity, profitability, activity, solvency, and market value, thus being able to describe the company's financial condition more comprehensively.

The Altman z-score method is a method with a higher level of accuracy than other methods such as the Zmijewski and Springate methods. This finding supports the results of previous studies conducted by Muchtar & Wedi (2026) and Harahap et al. (2025). In addition, these results are consistent with research conducted by Yuningsih et al. (2025) that the Altman z-score method is still relevant for use in manufacturing companies that have complex asset characteristics and operational activities.

The Zmijewski method achieved an accuracy rate of 76% and a type error rate of 24%. This indicates that the Zmijewski method ranks second only to the Altman z-score method in predicting financial distress in the raw materials sector. However, the average accuracy is still quite good because this method uses ratios that can provide an indication of a company's financial condition.

Meanwhile, the Springate method produced an accuracy rate of 60% and a type error rate of 40%. This low accuracy rate indicates that the ratio used in the Springate method is not fully capable of optimally identifying the condition of companies in the raw materials sector that are potentially delisted, making the Springate method less effective in predicting financial distress in the raw materials sector.

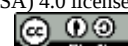
Conclusion

This study shows that the three methods produce different financial distress classifications for raw material companies that are potentially delisted on the Indonesia Stock Exchange for the 2020–2024 period because they use different financial ratio components. The Altman Z-Score method classifies FASW and SMCB as non-distressed companies, while LMSH, ALMI, and PURE are in the financial distress category. The Zmijewski method shows that LMSH and SMCB are consistently in a non-distressed condition, FASW began experiencing financial distress in 2024, ALMI experienced changes in conditions over several periods, while PURE is consistently in a financial distress condition. Meanwhile, the Springate method classifies almost all companies as financial distressed, except for LMSH in 2021. Based on the comparison of accuracy levels, the Altman Z-Score method has the highest average accuracy of 80% with an error type of 20%, followed by the Zmijewski method at 76% and the Springate method at 60%. These results indicate that the Altman Z-Score is the most appropriate method for detecting financial distress in raw material sector companies that have the potential for delisting.

This study still has limitations because it only used five raw material sector companies with potential delisting, with an observation period of 2020–2024, and limited the analysis to three financial distress prediction models. Therefore, further research is recommended using a wider sample size, a longer observation period, and comparing other prediction methods to obtain more comprehensive results. Practically, the results of this study can be used by company management as an early warning system to evaluate financial conditions and develop improvement strategies before experiencing more serious financial distress. For investors, these findings can be one of the considerations in assessing investment risk, particularly in raw material sector companies with potential delisting.

Bibliography

- Abubakar, R. (2021). Introduction to research methodology. SUKA-Press UIN Sunan Kalijaga.
- Ayem, S., & Anastasia, AS (2024). Financial distress: Liquidity, leverage, and profitability with firm size as a moderator. *Oikos: Journal of Economic Education and Economic Studies*, 9(1).
- Bank Indonesia. (2026). BI-Rate remains at 4.75%: Driving economic growth, maintaining stability. https://www.bi.go.id/id/publikasi/ruang-media/news-release/Pages/sp_284326.aspx
- Brights. (2024). What is the capital market? Definition, history, and



- benefits. <https://www.brights.id/id/blog/apa-itu-pasar-modal>
- Cahyani, SS, & Nugraeni. (2024). The effect of liquidity, leverage, and profitability on financial distress in manufacturing companies in the basic and chemical industries listed on the Indonesia Stock Exchange for the 2021-2023 period. *Costing: Journal of Economic, Business and Accounting*, 7(6).
- Ginting, YB, & Wardayani, W. (2022). Analysis of the Altman Z-Score method in predicting corporate bankruptcy (2016-2021). *Economics, Finance, Investment and Sharia (EQUITY)*, 4(2), 735-741. <https://doi.org/10.47065/ekuitas.v4i2.2519>
- Harahap, SD, Dasriyan, S., & Harahap, RHA (2025). Comparative analysis of bankruptcy prediction model accuracy between Altman and Springate models in tourism, restaurant, and hotel sector companies on the the IDX. *Journal of Geoeconomics*, 16(1). <https://doi.org/10.36277/geoekonomi.v16i1.547>
- Hendiansyah, A., & KN, R. (2025). Financial distress. *Indonesian Scientific Journal*, 10(3), 451-461. https://doi.org/10.1007/978-3-031-81653-6_300392
- Hidayah, NN, Andre, KA, Poly, EC, & Sujarweni, VW (2024). Financial distress analysis using the Altman Z-Score model in banking companies listed on the Indonesia Stock Exchange for the 2019-2021 period. *Journal of Accounting & Finance*, 15(1), 65-79.
- Indonesia Stock Exchange. (2018). Regulation Number IV concerning special provisions for listing shares on the acceleration board.
- Indonesia Stock Exchange. (2024). To improve investor protection, the IDX harmonizes delisting and relisting regulations. <https://www.idx.co.id/en/news/press-release/2140>
- Indo Premier. (2025). IDX announces potential delisting of 70 issuers. https://www.indopremier.com/ipotnews/newsDetail.php?jdl=BEI_Umumkan_70_Emit_en_Potensial_Delisting&news_id=210789&group_news=IPOTNEWS
- Investopedia. (2026). Basic materials sector: Examples and investment insights. https://www.investopedia.com/terms/b/basic_materials.asp
- Khasanah, NM, & RR (2024). Analysis of financial distress prediction using the Altman Z-Score model in retail companies listed on the Indonesia Stock Exchange for the period 2018-2022. *Oikos: Journal of Economic Education and Economic Studies*, 9(1).
- Lawrence, C., Susanti, E., & Sianipar, RT (2024). Financial distress analysis in measuring bankruptcy using the Altman Z-Score, Springate Score, and Zavgren methods at PT Garuda Indonesia Tbk. *Scientific Periodical Journal of Accounting Management Research*, 2(2).
- Muchtar, AS, & Wedi, RK (2026). Comparative analysis of the accuracy of the Altman, Springate, Zmijewski, and Springate models in predicting financial distress in software and IT services subsector companies. *Indonesian Scientific Journal*, 11(3).
- Mustakim, A.F., & D. (2025). Analysis of potential financial distress using the Altman Z-Score, Springate, and Zmijewski methods in nickel companies listed on the Indonesia Stock Exchange for the period 2020-2024. *Optimal: Journal of Economics and Management*, 5, 789-810.
- Fund Market. (2023). FASW's profits plummeted 80 percent in 2022. <https://pasardana.id/news/2023/2/15/fasw-profit-falls-80-percent-in-2022>
- Pelitawati, D., & Kusumawardana, RA (2020). Comparative analysis of the Altman, Zmijewski, and Springate models for predicting financial distress in companies listed on the Indonesia Stock Exchange.
- PT Trinitan Metals and Minerals Tbk. (2023). Annual report 2023. <https://trinitanmetals.com>
- Raharjo, B. (2023). The Zmijewski model and its relevance in predicting corporate bankruptcy. *Journal of Contemporary Accounting*, 15(1), 20-34.
- Rasyid, F. (2022). Quantitative and qualitative research methodology. IAIN Kediri Press.
- Resfitasari, E., Ginting, TM, Andini, U., & Rahayu, N. (2021). Analysis of financial distress prediction using the Altman Z-Score method at PT Waskita Karya Tbk. *Jurnal Aktiva: Riset Akuntansi dan Keuangan*, 3(3), 131-140.
- Rori, MC, Karamoy, IE, & Pusung, WE (2025). Analysis of potential financial distress in companies at risk of delisting. *Journal of Accounting, Finance, Taxation and Information (JAKPI)*, 5(2), 224-232. <https://doi.org/10.55606/jaemb.v5i3.7774>



- Saputra, D., & Arisyah, FND (2021). Comparative analysis of bankruptcy prediction accuracy between the Altman and Springate models in companies delisted from the Indonesia Stock Exchange. *Goeconomics*, 15(1), 26-37.
- Sinurat, M., Didik, G., & Ari, S. (2022). Capital market textbook. PT Inovasi Pratama Internasional.
- Sugiyono. (2022). Quantitative, qualitative, and R&D research methods (1st edition). Alfabeta.
- Thian, A. (2022). Financial statement analysis. Andi Publisher.
- World Bank. (2025). Indonesia's economy maintains resilience amid global uncertainty. <https://www.worldbank.org/in/news/press-release/2025/12/16/indonesia-s-economy-maintains-resilience-amid-global-uncertainty>
- Yuningsih, F., Suherman, UD, & Suhendi. (2025). Assessing financial distress in Sharia-compliant manufacturing firms using the Altman Z-Score. *Finansha: Journal of Sharia Financial Management*, 6(1).
- Zulhelmi, Mas, NM, & Kurniawan, IC (2025). Financial distress analysis using the Springate method in tourism, restaurant, and hotel companies in 2019-2024. *Economics, Finance, Investment, and Sharia (EKUITAS)*, 7(1), 267-276. <https://doi.org/10.47065/ekuitas.v7i1.8058>

