Volume 7 Issue 1 (2026) Pages 67 - 81
Economics and Digital Business Review
e-ISSN: 2774-2563

Financial Stress-Test of the Palm Oil Industry: Bankruptcy Prediction Using the Modified Altman Z-Score During the Downturn Phase

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Abstract

This study aims to predict the bankruptcy potential of Plantation Sub-Sector companies listed on the Indonesia Stock Exchange (IDX) during the critical downturn cycle of 2017-2019. This period serves as a stress-test window following the commodity boom. Employing a descriptive quantitative approach, the research analyzes secondary data from 10 companies selected through purposive sampling. The primary analytical tool is the Modified Altman Z-Score model. The results indicate severe financial distress within the sector due to price volatility and aggressive downstreaming policies. Specifically, out of the 10 sampled companies, only 1 company was classified as "Healthy" ($Z > 2.60$), 1 company was identified as "Vulnerable" or in the grey area ($1.10 < Z < 2.60$), and 8 companies were predicted to be "Bankrupt" ($Z < 1.10$). These empirical findings suggest a critical vulnerability in the plantation sector, highlighting an urgent need for financial restructuring and strategic management improvements to navigate post-boom challenges and ensure long-term sustainability.

Keywords: *Bankruptcy Prediction, Modified Altman Z-Score, Plantation Sub-Sector, Financial Distress.*

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INTRODUCTION

The Role of the Plantation Sector and Economic Context Companies are established with the primary objective of maximizing profit and ensuring long-term sustainability to increase shareholder value (Natsir et al., 2023). As the global economy evolves, the industrial landscape expands across various sectors, including services, trade, manufacturing, and agriculture (Ryandiansyah, 2019). In Indonesia, the plantation sub-sector plays a strategic role in national economic development. Indonesia is recognized as the world's largest producer of Crude Palm Oil (CPO), contributing significantly to the country's Gross Domestic Product (GDP) and foreign exchange reserves (GAPKI, 2023). Consequently, the stability of plantation companies is vital for the smooth running of Indonesia's economic activity. However, the rapid growth in the number of companies has intensified business competition, bringing inherent risks, including the potential for financial distress.

DOI : 10.37531/ecotal.v7i1.3605

The 2017–2019 Downturn CycleThe relevance of this study is underscored by the volatility of the plantation sector during the observation period of 2017 to 2019. This period represents a critical "stress-test" for the industry (Puspitasari et al., 2019). During this time, the palm oil industry faced significant challenges driven by global price fluctuations and trade barriers. Coordinating Minister for Economic Affairs, Darmin Nasution, highlighted that the industry faced a sharp decline in CPO prices, which fell by approximately 23.7% from US $636 per ton in early 2018 to US $485 per ton (CNN Indonesia, 2018). Furthermore, while CPO products dominated exports at 56% in 2008, this figure shifted to 24% by 2017, driven by downstreaming policies managed by the Palm Oil Plantation Fund Management Agency (BPDPKS).

This external volatility had tangible impacts on corporate financial health. Based on data from the Ministry of Finance (2018), several State-Owned Enterprises (BUMN) in the agricultural sector recorded alarming financial metrics. For instance, PT Perkebunan Nusantara recorded a critically low index value of 0.35 percent on the Altman scale, indicating severe distress. This phenomenon aligns with Signaling Theory (Spence, 1973), which suggests that financial statements serve as signals to stakeholders. A decline in financial performance serves as a "bad news" signal regarding potential insolvency. Therefore, companies must proactively anticipate these risks by conducting rigorous financial statement analysis to detect early warning signs of bankruptcy.

Modified Altman Z-Score to predict bankruptcy with a high degree of accuracy, researchers widely utilize the Z-Score model developed by Professor Edward I. Altman. While the original 1968 model utilized five variables for manufacturing firms, this study applies the Modified Altman Z-Score (Z''-Score) introduced by Altman (2000). This modified model is specifically designed for non-manufacturing companies and emerging markets by eliminating the Sales/Total Assets ratio (X5), which is often biased in sectors with volatile asset turnovers like plantations. The Modified Altman model uses four weighted financial ratios: Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earnings Before Interest and Tax to Total Assets (X3), and Book Value of Equity to Book Value of Total Liabilities (X4).

Recent empirical studies support the use of this model. Saputra and Nur Daluh Arisyah (2024) and Supitriyani et al. (2024) show that the Altman-type model achieves higher predictive accuracy than the Springate model for firms delisted from the Indonesia Stock Exchange, indicating that Springate tends to be overly optimistic in classifying financially distressed companies. Furthermore, studies on Indonesian agricultural and plantation firms report that Altman-type models generally outperform Springate, which often yields the lowest accuracy among the tested models. During periods of sharp CPO price declines, Indonesian plantation firms typically experience deteriorating liquidity and profitability, and Altman-type

DOI : 10.37531/ecotal.v7i1.3605

distress models are able to capture this weakening financial condition through declining working capital and earnings-based ratios (Wahyuni & Rubiyah, 2021)

Brigham and Houston (2019) emphasized that while profit is a short-term goal, maintaining corporate value is the long-term objective often threatened by financial mismanagement. However, few studies have specifically isolated the 2017–2019 period as a stress-test window to analyze the impact of the commodity price crash on solvency.

Therefore, this study aims to determine the bankruptcy prediction of 10 Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange for the period 2017 to 2019. By applying the Modified Altman Z-Score, this research intends to provide a comprehensive map of financial health—classifying firms into healthy, vulnerable, or distressed zones—and offer insights for stakeholders to mitigate the risk of bankruptcy during economic downturns.

Theoretical Framework: Signaling and Trade-off

Theory Financial distress is a condition where a company cannot meet its financial obligations or experiences a significant decline in financial condition prior to actual bankruptcy (Platt & Platt, 2002). To understand the dynamics of distress, this study integrates Signaling Theory and Trade-off Theory. Signaling Theory, introduced by Spence (1973), posits that financial statements serve as signals sent by management to investors to reduce information asymmetry. In this context, a declining Z-Score acts as a critical "negative signal" regarding the company's future solvency, warning stakeholders of potential risks.

Complementing this is the Trade-off Theory (Myers, 2001), which is particularly relevant for capital-intensive industries like plantations. This theory suggests that companies must balance the tax benefits of debt against the costs of financial distress. Plantation companies often carry significant liabilities due to land clearing and mill construction costs; thus, Trade-off Theory explains why firms with excessive leverage relative to their equity face a disproportionately higher probability of bankruptcy when external shocks occur.

Characteristics of the Plantation Sub-Sector

The plantation industry possesses unique characteristics that distinguish it from standard manufacturing, directly influencing the application of financial ratios. Unlike factories, plantation firms manage biological assets (oil palms) which have long gestation periods of three to four years before reaching maturity. This biological nature impacts financial metrics, particularly Retained Earnings (X2) and Liquidity (X1). As noted by Batubara (2019), younger plantation firms often show lower retained earnings due to high initial investments in immature plants (TBM) without immediate revenue generation. Furthermore, liquidity in this sector is highly seasonal and volatile, dependent on harvest cycles and global commodity prices.

The Modified Altman Z-Score Model

To predict bankruptcy within this specific context, the Modified Altman Z-Score (Z''-Score) is the primary analytical tool employed. Originally developed by

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Edward I. Altman in 1968, the model was revised in 2000 to accommodate non-manufacturing companies and emerging markets by eliminating the Sales/Total Assets ratio (X5), which was deemed biased against sectors with varying asset turnovers. The Modified model uses four variables: Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), EBIT to Total Assets (X3), and Book Value of Equity to Book Value of Total Liabilities (X4). This modification provides a more accurate assessment for Indonesian plantation companies, where asset values can fluctuate significantly.

Empirical Evidence and CPO Price Volatility (2020–2024)

Recent literature underscores the strong correlation between macroeconomic fluctuations and financial distress in the agricultural sector. The period of 2017 to 2019 was characterized by significant volatility in Crude Palm Oil (CPO) prices. Sibarani et al. (2021) empirically demonstrated that the global decline in CPO prices during this period had a systemic impact on the solvency of Indonesian plantation firms. Their research revealed that external price shocks degrade the EBIT (X3) and Equity (X4) components rapidly, pushing companies from the "Grey Zone" into the "Distress Zone" as fixed operational costs remain high while revenues contract. Additionally, Wahyuni and Rubiyah (2021) argued that companies failing to adjust their operational costs during these low-price periods showed a faster deterioration in their Z-Scores compared to those with flexible cost structures.

Model Accuracy and Validity

The selection of the Modified Altman Z-Score over other prediction models (such as Springate or Zmijewski) is supported by recent comparative studies. Saputra and Nur Daluh Arisyah (2024) and Supitriyani et al. (2024) tested various bankruptcy prediction models on Indonesian agricultural firms and concluded that the Modified Altman Z-Score demonstrated the highest accuracy rate. Their findings suggest that the Springate model tends to be overly optimistic, classifying distressed firms as healthy, whereas the Altman model provides a more prudent and conservative assessment. This is further supported by Wijayanti and Ratih (2022), who found that the Altman model serves as a more reliable early warning system for investors in high-risk sectors. Moreover, Sari and Mislinawati (2024) found that predictions made by the Altman Z-Score have a significant correlation with stock returns on the Indonesia Stock Exchange, implying that the market validates the variables used in the Altman model as credible indicators of firm value.

Synthesis

The plantation sub-sector is highly sensitive to external price shocks and capital structure risks. By grounding the analysis in Signaling and Trade-off theories and utilizing the empirically validated Modified Altman Z-Score, this study addresses the critical need to assess the financial health of plantation companies during the high-stress period of 2017–2019. The chosen model offers the necessary prudence and accuracy to detect early signs of bankruptcy amidst the volatility of the palm oil industry.

DOI : 10.37531/ecotal.v7i1.3605

METHODOLOGY

Research Design and Data Collection

This study employs a descriptive quantitative approach to assess the financial stability of the Plantation Sub-Sector. The primary objective is to measure financial distress using predetermined benchmarks derived from financial statements. The data used in this research are secondary data, specifically the audited annual financial reports of companies listed on the Indonesia Stock Exchange (IDX). The observation period spans three fiscal years, from 2017 to 2019. Data collection was conducted using the documentation method, where financial data and stock prices were retrieved from the official IDX website (www.idx.co.id) and verified against the respective companies' annual publications.

Population and Sampling Technique

The population for this study comprises all Plantation Sub-Sector companies listed on the IDX. According to Sekaran and Bougie (2016), to determine a representative sample, a purposive sampling technique was utilized based on specific inclusion criteria. (1) The company was listed on the IDX as a Plantation Sub-Sector firm during the 2017–2019 period; and (2) The company published complete financial reports consistently throughout the observation period. Based on these criteria, a total of 10 companies were selected as the research sample, as detailed in Table 1.

Table 1. Research Sample

No	Code	Company Name
1	AALI	PT. Astra Agro Lestari Tbk
2	SGRO	PT. Sampoerna Agro Tbk
3	SIMP	PT. Salim Ivomas Pratama Tbk
4	SSMS	PT. Sawit Sumbermas Sarana Tbk
5	PALM	PT. Provident Agro Tbk
6	SMAR	PT. Sinas Mas Agro Resources and Teknologi Tbk
7	UNSP	PT. Bakrie Sumatera Plantation Tbk
8	JAWA	PT. Jaya Agra Wattie Tbk
9	GZCO	PT. Gozco Plantation Tbk
10	TBLA	PT. Tunas Baru Lampung Tbk

Sources: www.idx.co.id

Data Collection Technique

The data collection technique utilized in this research is the documentation method, which involves the retrieval of archival secondary data (Sugiyono, 2016; Arikunto, 2013). The specific documents analyzed are the consolidated annual financial reports and the daily closing stock prices of Plantation Sub-Sector companies. These datasets were obtained from the official website of the Indonesia Stock Exchange (IDX). The use of audited financial reports published by the IDX ensures that the data used for the bankruptcy prediction analysis is credible, standardized, and publicly verifiable.

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Data Analysis Technique

The primary data analysis technique employed in this study is the Modified Altman Z-Score model, a robust multivariate discriminant analysis (MDA) approach utilized for bankruptcy prediction. This modified framework is specifically calibrated to assess financial distress by integrating four weighted financial ratios that capture liquidity, cumulative profitability, asset productivity, and solvency. Specifically, the model comprises: Working Capital to Total Assets (X1), Retained Earnings to Total Assets (X2), Earnings Before Interest and Taxes to Total Assets (X3), and Book Value of Equity to Book Value of Total Liabilities (X4). The mathematical function of the Modified Altman Z-Score analysis model is defined as follows

$$Z = 6{,}56(X1) + 3{,}26(X2) + 6{,}72(X3) + 1{,}05(X4)$$

Description:

X1 = Working Capital to Total Assets
X2 = Retained Earnings to Total Assets
X3 = Income Before Tax and Interest on Total Assets
X4 = Book Value of Equity to Book Value of Debt

The classification of healthy, vulnerable, and bankrupt companies is based on the Z-Score value of the Modified Altman model, which is as follows:

1. Distress Zone (Bankrupt): If Z'' < 1.10. This indicates the company is in severe financial difficulty with a high probability of bankruptcy.
2. Grey Zone (Vulnerable): If 1.10 < Z'' < 2.60. This indicates the company is in a vulnerable state. While not immediately bankrupt, the company requires immediate management intervention to avoid financial deterioration.
3. Safe Zone (Healthy): If Z'' > 2.60. This indicates the company is financially healthy with a very low probability of bankruptcy.

RESULTS AND DISCUSSION

Description of Research Variables

To facilitate understanding of the research results, the data obtained is described based on the ratio arrangement contained in the Altman Z-Score model to determine the Z-Score value of each company and categorize the value into predetermined groups, what is done is to calculate the financial ratios of the Plantation Sub-Sector Companies contained in the research sample with the Modified Altman Z-Score formula. After calculating the Z-Score value, the company is categorized as healthy, vulnerable, or bankrupt.

Working Capital to Total Assets

This ratio measures liquidity by comparing working capital to total assets. Working capital is defined as total current assets minus total current debt. Working capital is the capital used by the company to finance all business activities or company operations, especially those that have a short term.

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Table 2. Working Capital to Total Asset

Code	Year	Working Capital	Total Asset	WCTA (X1)
AALI	2017	2,171	25,119	0.09
	2018	1,424	26,856	0.05
	2019	2,905	26,974	0.11
SGRO	2017	0,252	8,364	0.03
	2018	-0,141	9,018	-0.02
	2019	-1,051	9,466	-0.11
SIMP	2017	0,534	33,859	0.02
	2018	-0,802	34,666	-0.02
	2019	-2,048	34,910	-0.06
SSMS	2017	3,602	9,623	0.37
	2018	4,946	11,296	0.44
	2019	1,977	11,845	0.17
PALM	2017	-0,125	2,871	-0.04
	2018	0,051	1,992	0.03
	2019	-0,004	0,002	-2.06
SMAR	2017	3,007	27,356	0.11
	2018	4,150	29,310	0.14
	2019	0,801	27,787	0.03
UNSP	2017	-10,157	14,048	-0.72
	2018	-11,624	13,363	-0.87
	2019	-10,800	8,399	-1.29
JAWA	2017	-1,059	3,332	-0.32
	2018	-0,035	3,442	-0.01
	2019	-0,267	3,489	-0.08
GZCO	2017	-0,018	3,480	-0.01
	2018	-0,105	2,910	-0.04
	2019	0,094	1,946	0.05
TBLA	2017	0,240	14,354	0.02
	2018	2,902	16,339	0.18
	2019	2,524	17,363	0.15

Sources: www.idx.co.id (data processed, 2025)

Based on the ratio table above, it can be seen that the ratio of working capital to total assets of the Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange shows a variety of values during the period 2017 to 2019. This shows that each company has a different ability to generate working capital. Working capital to total assets of each Plantation Sub-Sector Company fluctuates every year, there are even some companies that are negative. Companies whose working capital is negative will have difficulty in fulfilling their obligations due to the unavailability of sufficient current assets to meet these obligations.

Retained Earnings to Total Assets

DOI : 10.37531/ecotal.v7i1.3605

This profitability ratio measures the company's ability to earn profits. The company's ability to earn profits can be seen as long as the company operates. Retained earnings are profits or profits of the company that have not been divided for a certain period. This means that there are company profits that have not been distributed dividends and are still kept until a certain time for certain reasons.

Table 3. Retained Earnings to Total Asset

Code	Year	Retained Earnings	Total Asset	RETA (X2)
AALI	2017	2,069	25,119	0.082
	2018	1,520	26,856	0.057
	2019	0,243	26,974	0.009
SGRO	2017	0,249	8,364	0.030
	2018	0,063	9,018	0.007
	2019	0,039	9,466	0.004
SIMP	2017	0,647	33,859	0.019
	2018	-0,178	34,666	-0.005
	2019	-0,642	34,910	-0.018
SSMS	2017	0,790	9,623	0.082
	2018	0,086	11,296	0.008
	2019	0,012	11,845	0.001
PALM	2017	0,065	2,871	0.023
	2018	-0,111	1,992	-0.056
	2019	-0,070	0,002	-30.350
SMAR	2017	1,183	27,356	0.043
	2018	0,597	29,310	0.020
	2019	0,898	27,787	0.032
UNSP	2017	-1,616	14,048	-0.115
	2018	-1,479	13,363	-0.111
	2019	-4,893	8,399	-0.583
JAWA	2017	-0,208	3,332	-0.063
	2018	-0,300	3,442	-0.087
	2019	-0,282	3,489	-0.081
GZCO	2017	-0,175	3,480	-0.050
	2018	-0,353	2,910	-0.121
	2019	-0,584	1,946	-0.300
TBLA	2017	0,978	14,354	0.068
	2018	0,764	16,339	0.047
	2019	0,661	17,363	0.038

DOI : 10.37531/ecotal.v7i1.3605

Sources: www.idx.co.id (data processed, 2025)

Based on this retained earnings ratio table, it can be seen that retained earnings to total assets of the Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange show a variety of values during the period 2017 to 2019. Retained earnings to total assets of each Plantation Sub-Sector Company listed on the Indonesia Stock Exchange fluctuate every year, there are even some companies that are negative. Companies with negative values will have difficulty in carrying out their operations and debt will continue to increase, this will have a bad impact because investors will not invest in companies that have high levels of debt.

Earnings Before Tax and Interest

This profitability ratio measures the return on assets calculated by dividing income before tax and interest by total assets on the year-end balance sheet. Income before tax and interest is the income earned from its overall operations before paying taxes and interest. The higher the ratio, the company is able to utilize its total assets to generate profits.

Table 4. Earnings Before Tax and Interest to Total Asset

Code	Year	Earnings Before Tax and Interest	Total Asset	EBIT (X3)
AALI	2017	2,880	25,119	0.115
	2018	2,207	26,856	0.082
	2019	0,660	26,974	0.024
SGRO	2017	0,410	8,364	0.049
	2018	0,143	9,018	0.016
	2019	0,173	9,466	0.018
SIMP	2017	1,130	33,859	0.033
	2018	0,206	34,666	0.006
	2019	-0,197	34,910	-0.006
SSMS	2017	1,093	9,623	0.114
	2018	0,340	11,296	0.030
	2019	0,154	11,845	0.013
PALM	2017	0,073	2,871	0.025
	2018	-0,086	1,992	-0.044
	2019	-0,071	0,002	-30.723
SMAR	2017	1,206	27,356	0.044
	2018	0,701	29,310	0.024
	2019	1,166	27,787	0.042
UNSP	2017	-1,186	14,048	-0.084
	2018	-1,962	13,363	-0.147
	2019	-4,811	8,399	-0.573
JAWA	2017	-0,245	3,332	-0.074
	2018	-0,304	3,442	-0.088

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	2019	-0,316	3,489	-0.091
GZCO	2017	-0,216	3,480	-0.062
	2018	-0,420	2,910	-0.144
	2019	-0,623	1,946	-0.320
TBLA	2017	1,274	14,354	0.089
	2018	1,043	16,339	0.064
	2019	0,905	17,363	0.052

Sources : www.idx.co.id (data processed, 2025)

Based on the ratio table above, it can be seen that income before tax and interest on total assets of the Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange shows a variety of values during the period 2017 to 2019. Companies experience fluctuations every year, there are even some companies that are negative. Companies with negative values will have difficulty in carrying out their operations because low total assets do not generate profits and debt will continue to increase, so that the company is unable to pay taxes and interest when due.

Book Value of Equity to Book Value of Debt

This solvency ratio is used to assess the company's ability to meet its long-term obligations, or measure the ability of the company's capital to bear all its obligations. The book value of equity or commonly referred to as share capital is equal to the multiplication of the company's share price by the number of shares outstanding. This shows that the higher the ratio, the lower the level of the company in controlling debt.

Table 5. Book Value of Equity to Book Value of Debt

Code	Year	Book Value of Equity	Book Value of Debt	BVEBVD (X4)
AALI	2017	0,025	9,722	0.003
	2018	0,022	10,118	0.002
	2019	0,028	9,860	0.003
SGRO	2017	0,004	2,161	0.002
	2018	0,004	2,131	0.002
	2019	0,004	2,197	0.002
SIMP	2017	0,007	1,171	0.006
	2018	0,007	1,156	0.006
	2019	0,006	1,124	0.006
SSMS	2017	0,014	0,425	0.034
	2018	0,011	0,427	0.028
	2019	0,008	0,427	0.019
PALM	2017	0,002	0,219	0.011
	2018	0,001	0,226	0.008
	2019	0,001	0,290	0.005
SMAR	2017	0,009	4,015	0.002

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	2018	0,011	4,264	0.003
	2019	0,011	3,806	0.003
UNSP	2017	0,0004	-0,299,	-0.001
	2018	0,0002	-0,193	-0.001
	2019	0,0002	-2,384	0.000
JAWA	2017	0,0007	0,226	0.003
	2018	0,0005	0,178	0.003
	2019	0,0003	0,103	0.003
GZCO	2017	0,0003	0,250	0.001
	2018	0,0003	0,178	0.002
	2019	0,0003	0,136	0.002
TBLA	2017	0,006	0,796	0.008
	2018	0,004	0,895	0.005
	2019	0,005	1,003	0.005

Sources : www.idx.co.id (data processed, 2025)

Based on the ratio table above, it can be seen that the book value of equity to the book value of debt of the Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange shows a variety of values during the period 2017 to 2019. Book value of equity is a solvency ratio that measures the company's ability to meet its long-term debt. The higher the ratio, the company is able to meet its long-term debt or in other words the company is able to bear all its debts. Companies with low book value of equity can be said that the company is not in good condition or bankrupt, because the book value of equity is carried by the Z-Sxcore assessment standard, so that the company is unable to meet its long-term debt or in other words the company is unable to bear all its debts.

Modified Altman Z-Score Results

Based on the data from the calculation of the four variables used in the Modified Altman Z-Score model above, the next step is to enter these results into the equation model of the Modified Altman Z-Score by multiplying the results of the data above with the standard of each variable. Next, add up the multiplication results of each variable to find out the results of the bankruptcy prediction analysis with the Modified Altman Z-Score model.

Tabel 6. Results of the Modified Altman Z-Score Model Calculation

Code	**Year**	**X_1**	**X_2**	**X_3**	**X_4**	***Z-Score***	**Prediction**
AALI	2017	0.09	0.082	0.115	0.003	1.63	In a State of Bankruptcy
	2018	0.05	0.057	0.082	0.002	1.07	In a State of Bankruptcy
	2019	0.11	0.009	0.024	0.003	0.92	In a State of Bankruptcy

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SGRO	2017	0.03	0.030	0.049	0.002	0.63	In a State of Bankruptcy
	2018	-0.02	0.007	0.016	0.002	0.00	In a State of Bankruptcy
	2019	-0.11	0.004	0.018	0.002	-0.59	In a State of Bankruptcy
SIMP	2017	0.02	0.019	0.033	0.006	0.42	In a State of Bankruptcy
	2018	-0.02	-0.005	0.006	0.006	-0.10	In a State of Bankruptcy
	2019	-0.06	-0.018	-0.006	0.006	-0.49	In a State of Bankruptcy
SSMS	2017	0.37	0.082	0.114	0.034	3.50	Healthy
	2018	0.44	0.008	0.030	0.028	3.14	Healthy
	2019	0.17	0.001	0.013	0.019	1.23	In a Vulnerable State
PALM	2017	-0.04	0.023	0.025	0.011	-0.01	In a State of Bankruptcy
	2018	0.03	-0.056	-0.044	0.008	-0.27	In a State of Bankruptcy
	2019	-2.06	-30.350	-30.723	0.005	-318.91	In a State of Bankruptcy
SMAR	2017	0.11	0.043	0.044	0.002	1.16	In a Vulnerable State
	2018	0.14	0.020	0.024	0.003	1.15	In a Vulnerable State
	2019	0.03	0.032	0.042	0.003	0.59	In a State of Bankruptcy
UNSP	2017	-0.72	-0.115	-0.084	-0.001	-5.66	In a State of Bankruptcy
	2018	-0.87	-0.111	-0.147	-0.001	-7.06	In a State of Bankruptcy
	2019	-1.29	-0.583	-0.573	0.000	-14.21	In a State of Bankruptcy
JAWA	2017	-0.32	-0.063	-0.074	0.003	-2.80	In a State of Bankruptcy
	2018	-0.01	-0.087	-0.088	0.003	-0.94	In a State of Bankruptcy
	2019	-0.08	-0.081	-0.091	0.003	-1.40	In a State of Bankruptcy
GZCO	2017	-0.01	-0.050	-0.062	0.001	-0.64	In a State of Bankruptcy
	2018	-0.04	-0.121	-0.144	0.002	-1.62	In a State of Bankruptcy
	2019	0.05	-0.300	-0.320	0.002	-2.80	In a State of Bankruptcy

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TBLA	2017	0.02	0.068	0.089	0.008	0.96	In a State of Bankruptcy
	2018	0.18	0.047	0.064	0.005	1.77	In a Vulnerable State
	2019	0.15	0.038	0.052	0.005	1.46	In a Vulnerable State

Sumber : www.idx.co.id (data processed, 2025)

Based on the Table 6, the results of data calculations from the four variables using the Modified Altman Z-Score model can be seen that of the ten Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange for the period 2017 to 2019 there are eight Plantation Sub-Sector Companies that are predicted to be in a state of bankruptcy with a Z- Score value below 1.10. Eight Plantation Sub-Sector Companies listed on the Indonesia Stock Exchange for the period 2017 to 2019 are predicted to experience bankruptcy because working capital to total assets has decreased, then retained earnings to total assets and income before tax and interest to total assets have also decreased, so that the book value of equity to the book value of debt has also decreased, which means that the company is unable to meet its long-term debt or in other words the company is unable to bear all its debts.

PT Tunas Baru Lampung Tbk (TBLA) in 2017 is predicted to be in a state of bankruptcy with a score of 0.96. Whereas in 2018 to 2019 the company is predicted to be in a vulnerable state, with a score of 1.77 and 1.46, respectively. This is because working capital to total assets has increased, so that it can cover some of its debts. And there is one Plantation Sub-Sector Company listed on the Indonesia Stock Exchange for two consecutive years predicted to be in a healthy state, namely PT Sawit Sumbermas Sarana Tbk (SSMS) with a score above 2.60. However, in 2019 the company is predicted to be in a vulnerable state with a score of 1.23. This is because working capital to total assets has decreased, then retained earnings to total assets and income before tax and interest to total assets have also decreased, so that the book value of equity to the book value of debt has also decreased, which means that the company is having difficulty in meeting its long-term debt or in other words the company is unable to bear all its debts.

CONCLUSION

This study aimed to analyze the financial distress predictions of the Plantation Sub-Sector during the critical commodity downturn of 2017–2019 using the Modified Altman Z-Score model. The empirical results demonstrate a systemic financial fragility within the industry during the observation period. The analysis reveals that the majority of the sample, specifically 80% (eight out of ten companies), were classified into the Distress Zone (Predicted Bankrupt) with Z-Score values falling below the 1.10 threshold. These companies include major industry players: PT. Astra Agro Lestari Tbk (AALI), PT Sampoerna Agro Tbk (SGRO), PT Salim Ivomas Pratama Tbk (SIMP), PT Provident Agro Tbk (PALM), PT Sinar Mas Agro Resources and Technology Tbk (SMAR), PT Bakrie Sumatera Plantations Tbk (UNSP), PT Jaya Agra Wattie Tbk (JAWA), and PT Gozco Plantations Tbk (GZCO). This widespread distress signals that the sector was severely impacted by external shocks, where high

DOI : 10.37531/ecotal.v7i1.3605

operational leverage failed to cope with the sharp decline in CPO prices, resulting in negative working capital and eroded profitability.

Despite the overall negative trend, the study identified variations in financial resilience. PT Tunas Baru Lampung Tbk (TBLA) demonstrated moderate stability, categorized in the Grey Area (Vulnerable) with a Z-Score between 1.10 and 2.60 throughout the period. This suggests that while TBLA was not immediately insolvent, it faced significant liquidity pressure that required strategic management intervention.

Furthermore, PT Sawit Sumbermas Sarana Tbk (SSMS) emerged as the most resilient entity, being the only company predicted as Healthy (Safe Zone) with a Z-Score above 2.60 for two consecutive years (2017–2018). However, the severity of the industry downturn eventually impacted SSMS, as evidenced by its decline into the Vulnerable Zone in 2019 with a score of 1.23. This trajectory confirms that even the most efficient companies were not immune to the prolonged market volatility and the "lagged effect" of the 2018 price crash.

The findings imply that the Modified Altman Z-Score is highly sensitive to the volatility of the plantation sector, particularly regarding liquidity (X1) and profitability (X3). For investors, these results serve as a critical early warning signal; the prevalence of distress scores indicates high investment risk, necessitating a careful evaluation of portfolio allocation in this sector during commodity bear markets. For management, specifically for the eight companies in the distress zone, immediate financial restructuring is imperative. Strategies should focus on cost efficiency, divestment of non-productive assets, and debt restructuring to improve liquidity ratios. Future research is recommended to extend the observation period to the post-pandemic era to analyze whether the recent recovery in CPO prices has successfully reversed these distress signals.

References :

Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589–609. https://doi.org/10.1111/j.1540-6261.1968.tb00843.x

Altman, E. I. (2000). Predicting financial distress of companies: revisiting the Z-Score and ZETA® Models. New York: Stern School of Business, New York University.

Arikunto, S. (2013). Prosedur penelitian: suatu pendekatan praktik (Edisi revisi). Jakarta: Rineka Cipta

Batubara, R. H. (2019). Analisis perlakuan akuntansi aset biologis berdasarkan Pernyataan Standar Akuntansi Keuangan (PSAK) No. 69 tentang agrikultur pada PT. Perkebunan Nusantara III Medan. *Jurnal Akuntansi dan Keuangan Kontemporer (JAKK)*, 2(2), 9–22. https://doi.org/10.30596/jakk.v2i2.4762

Brigham, E. F., & Houston, J. F. (2019). Fundamentals of financial management (15th ed.). Cengage Learning.

Bursa Efek Indonesia. (2019). Laporan keuangan tahunan perusahaan sub-sektor perkebunan periode 2017-2019. Diakses dari www.idx.co.id.

CNN Indonesia. (2018, November 1). Harga CPO anjlok, pemerintah kaji ulang pungutan sawit. CNN Indonesia. https://www.cnnindonesia.com/ekonomi/20181101145435-

532-343235/harga-cpo-anjlok-pemerintah-kaji-ulang-pungutan-sawit

Gabungan Pengusaha Kelapa Sawit Indonesia (GAPKI). (2023). Refleksi industri sawit dan prospek ekonomi sawit. Jakarta: GAPKI.

Kementerian Keuangan Republik Indonesia. (2018). Laporan kinerja badan usaha milik negara (bumn) sektor pertanian. Jakarta: Kemenkeu.

Myers, S. C. (2001). Capital structure. Journal of Economic Perspectives, 15(2), 81–102.

Natsir, K., Bangun, N. ., & Waani, A. M. (2023). Analisis faktor-faktor yang mempengaruhi likuiditas pasar saham. *jurnal ekonomi*, 28(2), 155–176. https://doi.org/10.24912/je.v28i2.1414

Platt, H. D., & Platt, M. B. (2002). Predicting corporate financial distress: reflections on choice-based sample bias. *Journal of Economics and Finance*, 26(2), 184-199. https://link.springer.com/article/10.1007/BF02755985

Puspitasari, W., Syaukat, Y., & Irawan, T. (2019). The influence of macroeconomic factors on agricultural sector stock price in indonesia stock exchange. *International Journal of Research and Review*, 6(8), 332–339.

Ryandiansyah, Nabil Rizky (2019) "Structural change, productivity, and the shift to services: the case of Indonesia," *Economics and Finance in Indonesia*: Vol. 64: No. 2. https://doi.org/10.47291/efi.v64i2.593

Sekaran, U., & Bougie, R. (2016). Research methods for business: a skill-building approach (7th ed.). John Wiley & Sons.

Saputra, D., & Nur Daluh Arisyah, F. (2024). Analisis perbandingan ketepatan prediksi kebangkrutan antara altman dan model spring gate di perusahaan yang delisting di BEI. *Jurnal GeoEkonomi*, 15(1), 26–37. https://doi.org/10.36277/geoekonomi.v15i1.301

Sari, D. M., & Mislinawati, M. (2024). Navigating financial distress: Altman Z-Score predictive power on stock performance. *Jurnal Sains Riset*, 14(1), 16–24. https://doi.org/10.47647/jsr.v14i1.2086

Sibarani, R. Y., Irawati, N., & Muda, I. (2021). Analysis of financial ratio to predict financial distress in the sub sector of plantation company on indonesia stock exchange period 2010–2018. *International Journal of Research and Review*, 8(1), 36–46

Spence, M. (1973). Job Market Signaling. *The Quarterly Journal of Economics*, 87(3), 355–374. https://doi.org/10.2307/1882010

Sugiyono. (2016). Metode penelitian kuantitatif, kualitatif, dan R&D. Bandung: Alfabeta.

Supitriyani, S., Astuti, A., & Azwar, K. (2024). The implementation of springate, altman, grover and zmijewski models in measuring financial distress. *International Journal Of Trends In Accounting Research*, 3(1), 001-008. https://doi.org/10.54951/ijtar.v3i1.169

Wijayanti, M. O., & Ratih, S. (2022). Prediksi financial distress model Altman Z''-Score (studi pada perusahaan pelayaran yang terdaftar di Bursa Efek Indonesia periode 2019–2021). *Prosiding Seminar Nasional Ilmu Terapan (SNITER)*, 6(1), 1–8.

Wahyuni, S. F., & Rubiyah, R. (2021). Analisis financial distress menggunakan metode Altman Z-Score, Springate, Zmijewski dan Grover pada perusahaan sektor perkebunan. Maneggio: *Jurnal Ilmiah Magister Manajemen*, 4(1), 62–75. https://doi.org/10.30596/maneggio.v4i1.6714