

Financial Distress Assessment Through Altman Z-Score

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Abstract

This research aims to assess the financial distress condition of PT Waskita Karya Tbk (WSKT), a state-owned construction company in Indonesia, from 2017 to 2022 using the Altman Z-Score model. The Altman Z-Score combines financial ratios to predict the likelihood of bankruptcy. Secondary data derived from WSKT's financial statements were analyzed quantitatively using the Z-Score formula for non-manufacturing firms. The findings indicate that WSKT has experienced significant financial distress. In 2017 and 2022, WSKT was in the Distress Zone with scores of 0.96570 and 0.78271 respectively. The company was also in distress in 2020 with a negative score of -1.12303. For 2018, 2019 and 2021, WSKT was in the Grey Zone with scores of 1.51502, 1.05679 and 1.17451. WSKT did not achieve Safe Zone status during the six years examined. Overall, 66.67% of the period reviewed falls in the Distress Zone, predicting a high bankruptcy risk for WSKT. To address this financial vulnerability, recommendations include conducting operational optimization to enhance efficiency and profitability, diversifying business portfolios to tap into promising segments, and proactively monitoring financial health using analytical models like Altman Z-Score. With disciplined implementation of strategies to rectify distressed ratios, WSKT can achieve financial stability.

Keywords: Altman Z-Score, Financial Distress, Bankruptcy Prediction

Introduction

Financial health is a multidimensional concept crucial for assessing the overall well-being and stability of a financial entity. According to (Rodriguez-Fernandez, 2016), financial health extends beyond mere solvency, encompassing the capacity to meet short-term obligations, sustain profitability, and adapt to dynamic economic conditions. This holistic perspective aligns with the viewpoint of (Harrer & Lehner, 2024), who emphasize the importance of liquidity, profitability, and efficiency in defining financial health. In essence, the definition of financial health transcends a mere snapshot of financial metrics; it integrates strategic foresight, risk management, and adaptability to ensure the sustained well-being of an entity (Yusuf et al., 2024).

The urgency of financial assessment in evaluating a company's health or financial distress is a critical aspect of contemporary financial management. As emphasized by (Burston et al., 2022), assessing the financial status of a company is not merely a routine exercise but a proactive measure to anticipate potential challenges and ensure

sustainable growth. Financial assessment serves as a diagnostic tool that aids in identifying warning signs of distress and allows for timely intervention. This aligns with the findings of (Yoo et al., 2018) underscore that regular financial evaluations can help companies adapt to dynamic market conditions and manage risks proactively. In an era of increasing economic uncertainty, financial assessments are instrumental in enhancing a company's resilience and strategic positioning, as argued by (Garcia et al. 2022). Thus, the urgency of financial assessment lies in its pivotal role as a strategic management tool, guiding companies toward sustained financial health and mitigating the risks associated with financial distress.

Healthy financial conditions indicate a strong company characterized by strong liquidity, good solvency, and consistent profitability (Zhu et al., 2021). In contrast, financial distress implies challenges in meeting financial obligations, decreased profitability, and potential bankruptcy, indicating vulnerability and instability (Garcia & Johnson, 2018). Dynamic financial conditions require companies to carry out continuous evaluations to capture risks and opportunities that continue to develop

Altman's Z-Score, Springate, and Zmijewski models are widely recognized tools for predicting financial distress in companies. Altman's Z-Score, developed in 1968, categorizes companies into safe, grey, or distress zones based on multiple financial ratios (Altman, 2018). The Springate model, introduced in 1978, focuses on liquidity and working capital ratios to assess financial health (Springate, 1978). Zmijewski's model, proposed in 1984, emphasizes cash flow variables for bankruptcy prediction (Zmijewski, 1984). Recent research by (Di Natale et al., 2022) validates Altman's Z-Score effectiveness across diverse industries. Kim and Lee (2021) highlight the adaptability of the Springate model in assessing financial health in service-oriented industries. Garcia et al. (2022) emphasize the robustness of Zmijewski's model in considering cash flow dynamics.

The Altman Z-Score, devised by Edward I. Altman in 1968, comprises five key variables designed to evaluate the financial health of manufacturing companies. These variables are working capital to total assets (X1), retained earnings to total assets (X2), earnings before interest and taxes to total assets (X3), book value of equity to book value of total debt (X4), and sales to total assets (X5). Research by (Di Natale et al., 2022) and (Kim and Lee 2021) underscores the continued effectiveness of Altman's Z-Score in predicting financial distress across diverse manufacturing industries. These variables collectively provide a comprehensive view of a manufacturing company's financial well-being, aiding stakeholders in decision-making.

Altman's Zeta model, introduced in 1997 for non-manufacturing companies, employs four key variables to assess financial health: X1 evaluates short-term liquidity, X2 gauges internal financing and historical profitability, X3 measures operational efficiency, and X4 reflects solvency and leverage. Recent studies (Garcia et al., 2022; Kim and Lee, 2021) affirm the model's adaptability and effectiveness in predicting financial distress across various industries, providing stakeholders with comprehensive insights for informed decision-making (Altman, 2018).

Financial Distress Assessment Through Altman Z-Score

Method

Data Collection Method

Population and Sample

A population refers to a collection of entities sharing particular attributes. The population under consideration in this study comprises the financial statements of PT. Waskita Karya. The sample, in this context, constitutes a segment of this population chosen to be a representative sample. Specifically, it encompasses the financial reports of PT. Waskita Karya spanning from 2017 to 2022

Table III.2: Operational Variabel

No	Variabel	Definition	Indikator	Scale
1	Working Capital To Total Assets Ratio (X1)	This ratio assesses a company's ability to cover its short-term obligations with its total assets (Altman, 2018)	Working Capital To Total Assets Ratio formula: $X1 = (\text{Working Capital}) / (\text{Total Asset})$	Ratio
2	Retained Earnings To Total Assets Ratio (X2)	This ratio measures the proportion of a company's total assets that are financed by its retained earnings (Anjum, 2012)	Retained Earnings To Total Assets Ratio formula : $X2 = (\text{Retained Earnings}) / (\text{Total Asset})$	Ratio
3	Earnings Before Interest and Taxes To Total Assets Ratio (X3)	This ratio evaluates the company's operating profitability in relation to its total assets. (Panigrahi, 2019)	Earnings Before Interest and Taxes To Total Assets Ratio formula: $X3 = (\text{EBIT}) / (\text{Total Asset})$	Ratio
4	Book Value Of Equity To Book Value Of Debt Ratio (X4)	This ratio indicates the relationship between a company's equity and its debt. (Manaseer & Al-Oshaibat, 2018)	Book Value Of Equity To Book Value Of Debt Ratio formula : $X4 = (\text{Total Equity}) / (\text{Total Debt})$	Ratio

Source: Processed Data (2023)

Data Collection and Data Resource

The data for this study is sourced from secondary data. Data collection methods employed in this research include the use of documentation techniques and an extensive review of relevant literature. The research relies on annual financial reports issued by PT Waskita Karya Tbk for the years 2017, 2018, 2019, 2020, 2021, and 2022. Access to the company's annual financial report data is facilitated through downloads from the official website of the Indonesia Stock Exchange, specifically www.idx.co.id. Additionally, the research will incorporate citations from scholarly works, such as scientific articles, journals, papers, and documents that are pertinent to this study

Data Analysis Method

The analysis method employed in this study utilizes the Altman Z-Score model with the equation function as follows:

$$Z'' = 6,56 X1 + 3,26 X2 + 6,72 X3 + 1,05 X4$$

Description:

Z'' = Bankruptcy index for Non-Manufacturing

Companies $X1$ = Working capital/total asset

$X2$ = Retained earnings/total asset

$X3$ = Earnings before interest and taxes/total

asset $X4$ = Market value of equity/book value
of total debt

Here are three categories of Z values for non-manufacturing companies:

- $Z'' > 2.90$ indicates that the company is in the safe zone.
- $1.23 < Z'' < 2.90$, it indicates that the company is in the grey zone.

$Z'' < 1.23$, it indicates that the company is in the distress zone

Operational Variabel

The variables investigated in this study are four crucial ratios that serve as indicators of potential bankruptcy in a company, according to (Altman, 1967). These five ratios are Working Capital To Total Assets Ratio ($X1$), Retained Earnings To Total Assets Ratio ($X2$), Earnings Before Interest and Taxes To Total Assets Ratio ($X3$), and Book Value Of Equity To Book Value Of Debt Ratio ($X4$). Here is an explanation of each variable

Results and Discussion

Analysis

The following is a table of recapitulation of PT Waskita Karya Tbk's financial statements along with a list of variables and their nominal values used as the Altman Z-Score calculation ratio.

Financial Distress Assessment Through Altman Z-Score

Table IV.1 Recapitulation of WSKT Financial Statements 2017-2022

Variable	Year					
	2017	2018	2019	2020	2021	2022
Current Assets	52.427.017.359	66.989.129.822	49.037.842.886	32.538.762.593	42.588.609.406	33.430.242.924
Current Liabilities	52.309.197.858	56.799.725.099	45.023.495.139	48.237.835.913	27.300.293.001	21.452.886.385
Working Capital	117.819.501	10.189.404.722	4.014.347.746	- 15.699.073.320	15.288.316.404	11.977.356.539
Total Assets	97.895.760.838	124.391.581.623	122.589.259.350	105.588.960.060	103.601.611.883	98.232.316.628
Retained Earnings	5.760.142.991	8.763.909.422	8.561.015.893	- 2.172.221.640	- 7.693.325.785	- 9.940.244.897
Earnings before interest and tax	6.526.601.124	7.966.901.773	5.239.471.615	- 4.339.358.932	4.075.569.078	1.968.373.511
Total Equity	22.754.824.809	28.887.118.750	29.118.469.188	16.577.554.765	15.461.433.243	14.244.684.680
Total Liability	75.140.936.029	95.504.462.872	93.470.790.161	89.011.405.294	88.140.178.639	83.987.631.948

Source: Financial statement of PT Waskita Karya Tbk Year 2017-2022 Table IV.1 is a financial summary of PT Waskitakarya for the years 2017 to 2022, presented in thousands of Rupiah. Table IV.1 includes variables such as Current Assets, Current Liabilities, Working Capital, Total Assets, Retained Earnings, Earnings Before Interest and Tax (EBIT), Total Equity, and Total Liabilities

Based on Table IV.1 there are striking fluctuations from year to year. PT Waskita Karya Tbk 's Current Assets reached a peak in 2018 and then declined, reflecting changes in the company's liquid assets. In addition it can be seen that Working capital became negative in 2020, indicating more short-term liabilities than assets, but increased significantly in 2021.

Retained Earnings and EBIT of PT Waskita Karya Tbk experienced a sharp decline in 2020, this is due to the operational challenges experienced by the company, and has not recovered to pre-2020 levels by 2022. In addition, it can also be seen that Total Equity has been declining since 2019, which reflects the decline in the company's net worth. It can therefore be concluded that, overall, these financial figures show that PT Waskita Karya Tbk is facing significant challenges, especially in 2020, and is trying to make a partial recovery in the following years.

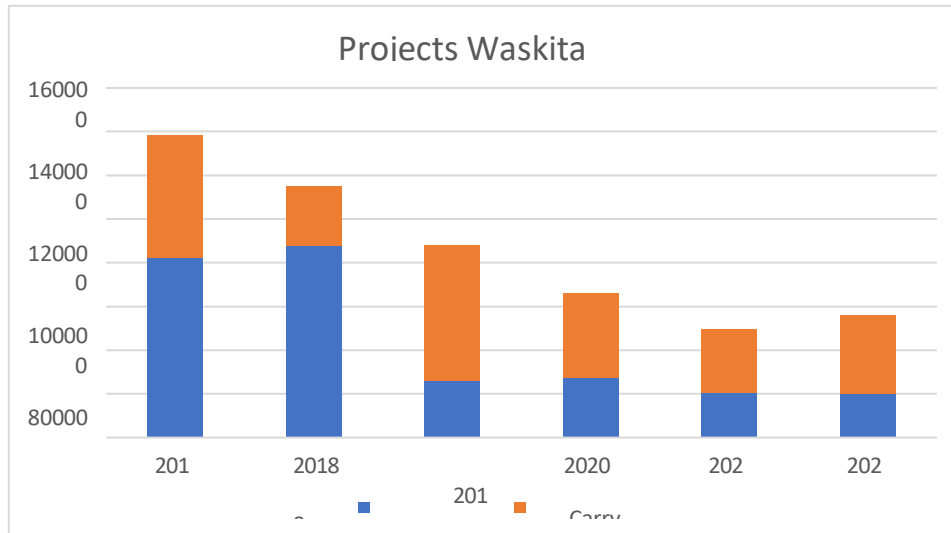


Figure IV.1 New Contract and Carry Over Projects in 2017-2022 Source: Processed Data (2023)

Significant fluctuations in the value of current assets and liabilities between years show the uncertainty of the company's cash flow to finance new projects and carry over projects that are still ongoing. The decline in working capital even to negative in 2020 indicates that the company is experiencing liquidity difficulties to fund daily operational activities, let alone construction projects that require large cash flows. This condition certainly greatly hinders the acquisition of new projects and the completion of carry over projects.

The decline in the company's equity from year to year also narrows the space for management to expand the business through new projects with internal funding. Meanwhile, the continued increase in debt will burden cash flow in the future. Overall, the challenges in PT Waskita Karya's financial statements have the potential to reduce the company's capacity to handle a portfolio of new projects and carry over projects. Strategic steps are needed to restore the company's financial condition.

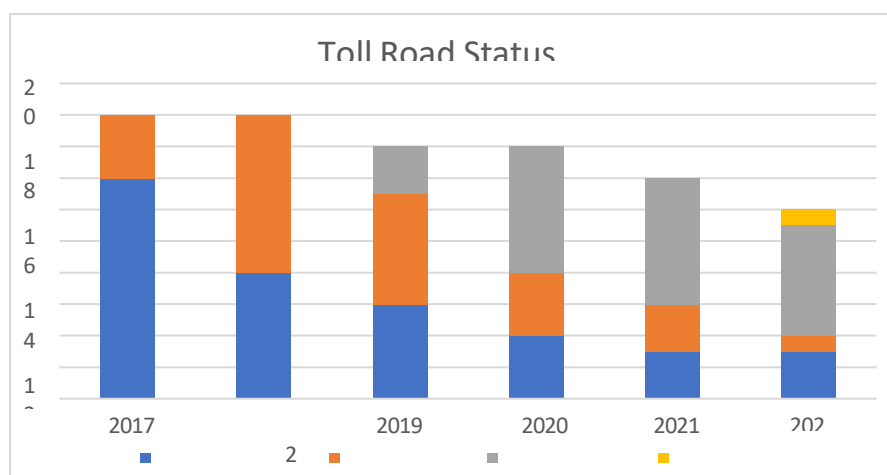


Figure IV.2 Toll Road Status Projects in 2017-2022 Source: Processed Data (2023)

From the figure, it can be seen that in 2017, PT Waskita Karya Tbk had 18 toll road projects, of which 4 were already operating. In 2018 the number of operating toll road projects increased to 10. In 2019, the toll roads owned by the company decreased to 16, this was because in December 2019, WSKT had fully divested its ownership in the Solo-Ngawi and Ngawi-Kertosono toll roads which

had previously been operating. The total funds obtained from this transaction amounted to IDR 2.4 trillion. Then in 2020, there were 2 toll roads that changed status from fully operating to partial operating. Those toll roads are the Ciawi - Sukabumi and Pasuruan - Probolinggo toll roads. This was due to during the large- scale social restrictions (PSBB) in April-June 2020, toll road traffic decreased by almost 50% from the normal daily traffic average. In 2021, WSKT carried out divestments (release) of share ownership of three toll roads, namely the Cinere- Serpong Toll Road, Cibitung-Cilincing Toll Road, and Semarang-Batang Toll Road. From the divestment WSKT obtained IDR 5.38 trillion. Then this year, the company also added a new toll road project, namely Gedebage - Tasikmalaya - Cilacap. With a project investment value of IDR 58 trillion.

In 2022, WSKT added a toll road route, originally Ciawi - Sukabumi to Bogor - Ciawi - Sukabumi, in addition WSKT also divested two of its toll roads, namely Kanci - Pejagan and Pejagan - Pemalang, generating IDR 3.6 trillion from the divestment. In addition, the Gedebage - Tasikmalaya - Cilacap toll road which was originally in the construction phase changed to the review phase. This was due to the failure to sign banking financial support (financial close). A financial close can occur due to the poor reputation of the company in the eyes of banks, for example a history of loan defaults or poor financial performance. Due to this financial close the company needs to re-tender even though this will affect the project completion process which has to be delayed. Even though building the longest toll road in Indonesia at 206.65 kilometers had cost IDR 56.2 trillion in development costs (cnbcindonesia.com, 2024).

From the above description, it can be seen that Waskita Karya is actively building new toll road projects every year, as evidenced by the increasing number of projects each year. However, some toll road projects that have been operating are being divested by WSKT. This is likely done to raise funds for new projects, or to cover company debts.

Financing constraints caused the Gedebage-Tasikmalaya-Cilacap toll road project which had begun construction to be re-tendered and delayed. Therefore, Waskita Karya needs to be thorough in project planning to avoid problems midway

Ratio in Altman Z-Score Model Analysis

Analysis of financial difficulties will greatly help decision makers to determine policies towards companies that may experience bankruptcy. Altman Z- Score is one of the models to predict the risk of bankruptcy by analyzing the company's financial statements. In this study the authors used a sample of one of the BUMN companies, namely PT Waskita Karya Tbk with a research period from 2017 to 2022.

Working Capital to Total Assets

In the context of Altman Z-Score, the Working Capital to Total Assets Ratio serves to evaluate the liquidity and solvency of the company, thus providing an overview of how efficiently the company uses its assets to cover its short-term liabilities so that this ratio helps measure the adequacy of the company's working capital.

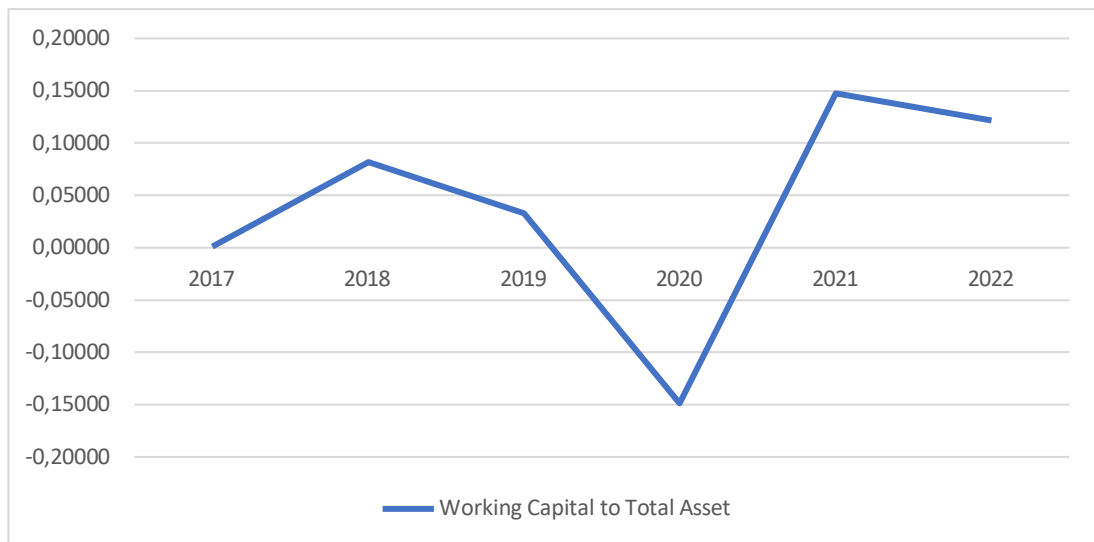


Figure IV.3 Working Capital to Total Assets of WSKT in 2017-2022 Source: Processed Data (2023)

From Figure IV.3 it can be seen that there is a significant decrease in the company's ability to cover its short-term liabilities using its total assets from 2018 to 2020. This is because at that time even though the company had total assets that increased every year, the company did not have sufficient liquidity to cover its short-term obligations. This decreasing amount of working capital shows that the company has more current liabilities than current assets.

If the company is unable to increase its working capital, this can lead to difficulties in paying debts, disrupt daily operations, increase the risk of bankruptcy, and limit the company's growth ability. It can also affect credit ratings, lead to a higher cost of capital, and disrupt business relationships with suppliers and other stakeholders. Therefore, it is important to take the necessary actions to improve working capital so that PT Waskita Karya Tbk remains financially healthy.

Retained Earnings to Total Assets

In the context of Altman Z-Score, the Retained Earnings to Total Assets ratio provides an overview of the company's ability to keep the profits it earns to be accumulated or used in order to support the assets it owns. Therefore, this ratio can reflect potential problems related to profitability and asset management.

Financial Distress Assessment Through Altman Z-Score

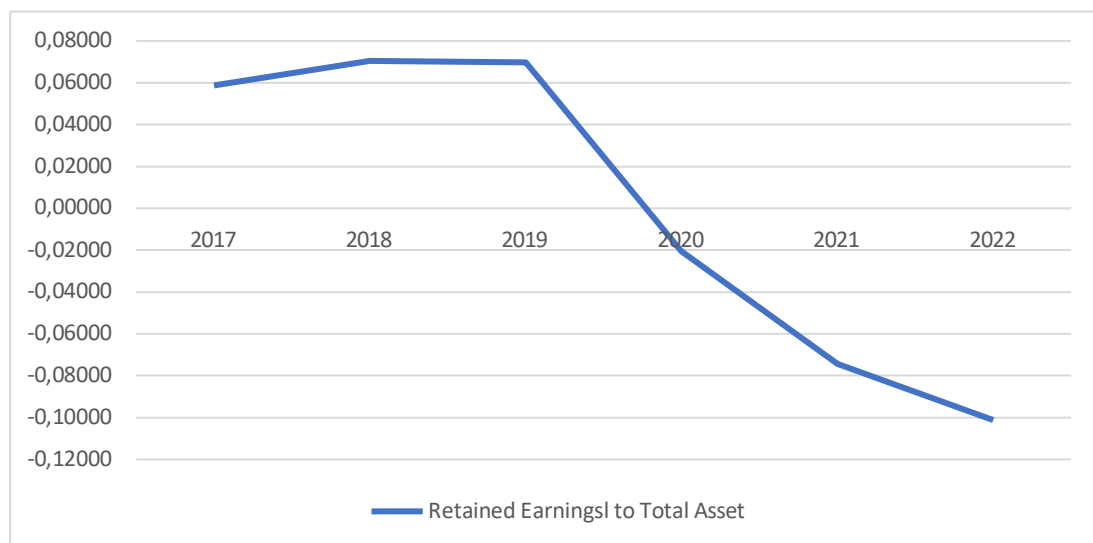


Figure IV.4 Retained Earnings to Total Assets WSKT in 2017-2022 Source: Processed Data (2023)

From Figure IV.4 it can be seen that there is a significant decrease in the company's ability to obtain retained earnings to be accumulated in order to support the company's assets from 2019 to 2022. This is because at that time the company experienced operational losses, so the profit generated was not enough to cover the

losses. However, management chose to continue paying high dividends to shareholders, as a result, retained earnings decreased significantly. The greater the dividends paid, the smaller the amount of accumulated earnings.

A decrease in retained earnings can reduce a company's ability to invest in growth or address urgent financial issues. It can also affect investors' and shareholders' assessment of the company's performance, which may impact the company's share price and reputation in the market. Therefore, management needs to monitor retained earnings closely and make the right decisions to maintain and increase them in line with existing business strategies.

Earnings Before Interest and Tax (EBIT) to Total Asset

In the context of the Altman Z-Score, the Earning Before Interest and Tax (EBIT) to Total Assets ratio provides an overview of how efficiently a company's assets are used to generate operating profit before accounting for interest and taxes. This ratio measures the productivity of the company's assets in generating profits before considering the effect of interest expense and tax expense.

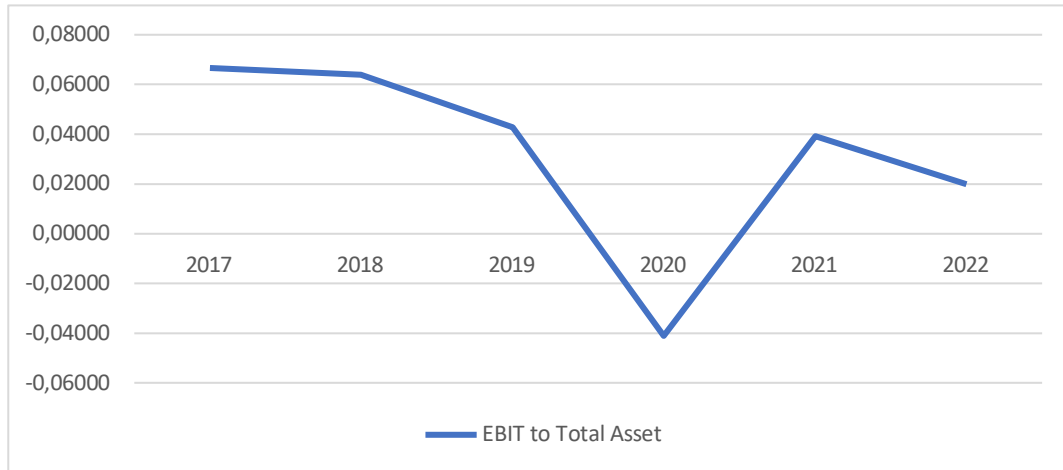


Figure IV.5 EBIT to Total Asset WSKT in 2017-2022 Source: Processed Data (2023)

From Figure IV.5 it can be seen that there is a decrease in the productivity of the company's assets in generating earnings before interest expense and taxes from 2017 to 2020. This is because at that time the company experienced a decrease in operating profit caused by a decrease in sales resulting in a decrease in EBIT. In addition, the increase in the company's total assets without a proportional increase in operating profit (EBIT), supports the decline in this ratio because the efficiency of the assets owned by the company also decreases.

If a company is unable to increase its Earnings Before Interest and Taxes (EBIT), which continues to decline, this can present various problems. A sustained decline in EBIT may indicate underlying problems in the company's operations, such as uncontrolled costs or declining revenues. This can reduce the company's profitability, impair the ability to service debt and investments, and potentially affect the company's share price and reputation. Companies may need to conduct an in-depth evaluation of their business models, operational strategies, and cost- saving efforts to reverse the downward trend in EBIT and ensure sustainable business continuity.

Book Value of Equity to Book Value of Debt

In the context of the Altman Z-Score, the Book Value of Equity to Book Value of Debt ratio can provide an overview of the company's capital structure, specifically the extent to which equity is used in comparison to debt in the company's funding.

Financial Distress Assessment Through Altman Z-Score

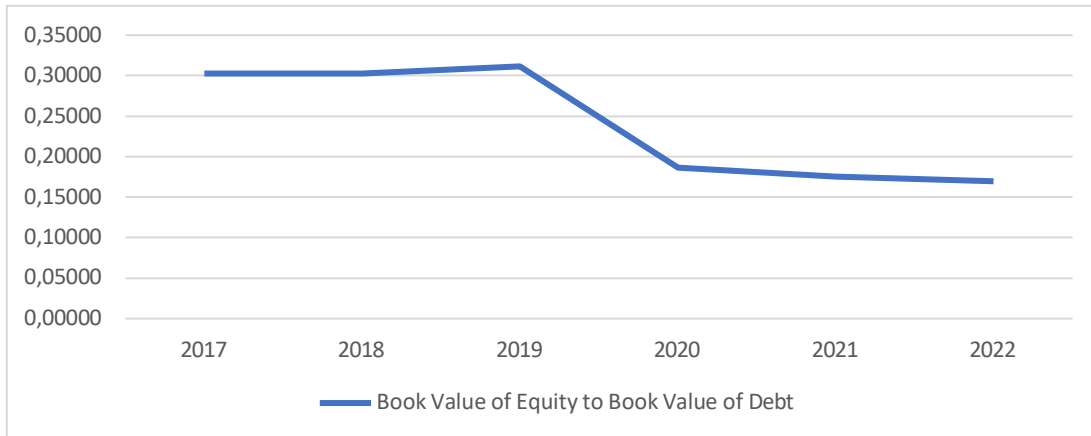


Figure IV.4 Book Value of Equity to Book Value of Debt in 2017-2022 Source: Processed Data (2023)

From Figure IV.4 it can be seen that there is a decrease in the company's capability to fulfill all its debts with its capital from 2019 to 2022. This shows that the company has a smaller proportion of equity compared to its debt. This can be considered a negative indicator in the context of Altman Z-Score because the company has more debt obligations to fulfill. The increase in debt is due to a large number of unpaid bills from vendors (suppliers and subcontractors). In addition, the capital or equity owned by Waskita Karya has also decreased significantly so that it greatly affects the decline in this ratio.

If a company is unable to increase its declining equity and continues to increase its liabilities, this can be a serious sign of financial imbalance. A decrease in equity could indicate that the company is experiencing sustained losses or high dividend distributions, while an increase in liabilities could indicate an increase in debt or excessive operating obligations. These imbalances can increase the risk of bankruptcy, affect credit ratings and create liquidity issues. Companies need to take steps to manage debt, improve profitability, or consider raising new capital to strengthen equity and maintain long-term financial stability.

WKST Worst Ratio In Altman Z-Score Model

WKST Worst Ratio In Altman Z-Score Model is retained earnings to total assets. This is due to the company's decision to continue distributing high dividends to shareholders despite experiencing operating losses from 2019 to 2022. The dividend should have been distributed from the profits earned, not from the retained earnings. As a result of distributing high dividends amidst operating losses, the amount of retained earnings that the company should have retained has been reduced. Meanwhile, the company's operating profit is insufficient to cover losses let alone to be retained as retained earnings. Therefore, the retained earnings balance of PT Waskita Karya Tbk eventually decreased significantly. This has an impact on the low ratio of retained earnings to total assets of the company.

To improve the ratio of retained earnings to total assets, PT Waskita Karya Tbk should retain profits and accumulate them as retained earnings to strengthen the company's own capital. Thus, the ratio to total assets will improve. In addition, the company also needs to make operational cost efficiency by cutting ineffective expenses so that operating losses can be reduced. Revenue should also be increased by finding new sources and increasing sales to improve operating profit. Non-productive assets should be sold to increase cash that can reduce the company's losses. Through these steps, PT Waskita Karya's operational performance can be improved so that the profit generated can be retained and improve the overall ratio.

Assessment of Altman Z-Score Model

The following are the results of the analysis uses the Altman Z-Score Zeta model as a method to analyze the possibility of bankruptcy of PT Waskita Karya Tbk:

Table IV.2 Assessment of Altman Z-Score WSKT in 2017-2022

No	Year	Z-Score	Zone
1	2017	0,96570	Distress Zone
2	2018	1,51502	Grey Zone
3	2019	1,05679	Distress Zone
4	2020	-1,12303	Distress Zone
5	2021	1,17451	Grey Zone
6	2022	0,78271	Distress Zone

Source: Processed Data (2023)

From Table IV.2, it can be seen that based on the assessment of the possibility of bankruptcy using the Altman Z-score Zeta model, it can be seen that the company PT Waskita Karya Tbk has never been in a Safe Zone condition. On the other hand, it can be seen that the company experienced 4 years in distress zone conditions, out of 6 years of research time in this study. This means that there is 66.67% probability of PT Waskita Karya Tbk experiencing bankruptcy (Distress Zone), 33.33% in the grey zone, and 0% probability PT Waskita Karya Tbk is considered to have good financial health (Safe Zone).

Companies that are constantly in the Distress Zone have a high potential to face bankruptcy. This can be caused by serious financial problems, such as liabilities that exceed assets or difficulty paying debts. In addition, companies that are considered high

Financial Distress Assessment Through Altman Z-Score

risk are likely to face difficulties in obtaining additional financing from outside parties. Creditors may be reluctant to provide loans or provide very strict conditions

Conclusion

Altman Z-Score analysis for PT Waskita Karya Tbk from 2017 to 2022 indicates significant financial distress. In 2017, the company was in the Distress Zone with a score of 0.96570. The situation improved slightly in 2018 with a score of 1.51502, placing it in the Grey Zone. However, it returned to the Distress Zone in 2019 with a score of 1.05679 and progressively worsened in 2020 with a negative score of -1.12303. In 2021 the company improved again because it had a Z-Score value of 1.17451, thus placing the company in the Grey Zone. However, in 2022 the company experienced financial difficulties again which caused the Z-Score value to decrease to 0.78271 so that the company returned to the distress zone. So it can be seen that the company never reached the Safe Zone during this period, and experienced four years in the Distress Zone out of six years.

To address its financial challenges and the risk of bankruptcy, PT Waskita Karya Tbk needs to take several concrete steps. First, reducing or eliminating dividend distribution for fiscal years 2022 and 2023 will increase the company's retained earnings. Second, conducting audits and evaluation of operating expenses can identify potential cost savings, which will boost net income. Third, increasing revenue by optimizing existing production capacity has the potential to increase operating profit. Fourth, conducting asset revaluation can increase asset value, with the revaluation surplus recorded as an increase in retained earnings. Finally, selling non-productive assets can generate cash proceeds to be transferred to the company's cash balances.

In summary, by taking steps to reduce dividends, cut costs, boost revenues, revalue assets, and sell non-productive assets, PT Waskita Karya Tbk can potentially increase retained earnings. This will improve the company's ratio of retained earnings to total assets and make the company avoid bankruptcy. Implementing a combination of these financial and operational strategies will strengthen PT Waskita Karya's overall financial position.

REFERENCES

- Altman, E. I. (1967). *The prediction of corporate bankruptcy: A discriminant analysis*. University of California, Los Angeles.
- Altman, E. I. (2018). Applications of distress prediction models: what have we learned after 50 years from the Z-score models? *International Journal of Financial Studies*, 6(3), 70.
- Anjum, S. (2012). Business bankruptcy prediction models: A significant study of the Altman's Z-score model. *Available at SSRN 2128475*.
- Burston, M., Ranasinghe, K., Gardi, A., Parezanović, V., Ajaj, R., & Sabatini, R. (2022). Design principles and digital control of advanced distributed propulsion systems. *Energy*, 241, 122788.
- Di Natale, L., Svetozarevic, B., Heer, P., & Jones, C. N. (2022). Physically consistent neural networks for building thermal modeling: theory and analysis. *Applied Energy*, 325, 119806.
- Harrer, T., & Lehner, O. M. (2024). Assuring the unknowable: a reflection on the evolving landscape of sustainability assurance for financial auditors. *Current Opinion in Environmental Sustainability*, 67, 101413.
- Manaseer, S., & Al-Oshaibat, S. D. (2018). Validity of Altman Z-score model to predict financial failure: Evidence from Jordan. *International Journal of Economics and Finance*, 10(8).
- Panigrahi, C. M. A. (2019). Validity of Altman's 'z'score model in predicting financial distress of pharmaceutical companies. *NMIMS Journal of Economics and Public Policy*, 4(1).
- Rodriguez-Fernandez, M. (2016). Social responsibility and financial performance: The role of good corporate governance. *BRQ Business Research Quarterly*, 19(2), 137–151.
- Yoo, J.-C., Beiyuan, J., Wang, L., Tsang, D. C. W., Baek, K., Bolan, N. S., Ok, Y. S., & Li, X.-D. (2018). A combination of ferric nitrate/EDDS-enhanced washing and sludge-derived biochar stabilization of metal-contaminated soils. *Science of the Total Environment*, 616, 572–582.
- Yusuf, M., Dasawaty, E., Esra, M., Apriwenni, P., Meiden, C., & Fahlevi, M. (2024). Integrated reporting, corporate governance, and financial sustainability in Islamic banking. *Uncertain Supply Chain Management*, 12(1), 273–290.
- Zhu, L., Li, M., & Metawa, N. (2021). Financial risk evaluation Z-score model for intelligent IoT-based enterprises. *Information Processing & Management*, 58(6), 102692.