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Implementation The Altman Method (*Z"-Scored*) For Predicting Bankruptcy: Empirical Study on Nondurable Household Products Subsector Companies Listed on The Indonesia Stock Exchange in 2016-2022

Rezki Indalesari[1], Kurniaty[2], Rizka Zulfikar[3], Farida Yulianti[4], Lamsah[5]
Islamic University of Kalimantan, Economic Faculty, Management Department [1,2,3,4,5]
E-mail: riskyyindah@gmail.com

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Abstract.
This research was conducted to find out how many companies are included in the safe zone, gray zone, and danger zone. This study uses variables X1 to X4, namely, X1 describes the ratio of working capital, X2 and X3 describes the ratio of operating profit and X4 describes the ratio that measures a company's ability to pay debts. The research design is a quantitative descriptive and an empirical study. The research population is all non-durable household products sub-sector companies listed on the Indonesia Stock Exchange in 2016-2022. The research sample was taken using purposive sampling, namely taking samples from the population based on certain criteria, and the number of samples was 5 companies for the 2016-2022 period. The results of this study indicate (1) Four of the five sample companies in this study are classified as not bankrupt, namely PT Mandom Indonesia Tbk, PT Mustika Ratu Tbk, PT Kino Indonesia Tbk and PT Unilever Indonesia Tbk. One company out of five samples is in the bankrupt category, namely PT Martina Berto Tbk. (2) The ratio of X1, X2, X3, and X4 with fluctuating values can cause the Z-Scored to fluctuate too.

Keywords: *Bankruptcy Prediction, Altman Z"-Score, Signaling Theory, Financial Distress, Financial Ratios*

1. Introduction

Indonesia's economy continues to grow, as do companies in Indonesia. To meet the needs of society, various sectors of production are needed in economic activities. One of them is the manufacture of consumer products such as food, pharmaceuticals, and cosmetics, which are growing in Indonesia because the demand is quite large. The manufacturing sector has an important role in Indonesia's economic development, with the potential to have a broad impact by increasing the value of raw materials, increasing labor, and contributing foreign exchange.

In 2022, the management of the industrial sector in its investment value is expected to contribute 40.9 percent of the total investment of Rp. 892.4 trillion. In addition, the manufacturing industry had a significant impact on domestic capital inflows (PMDN) of Rp 104.9 trillion and foreign capital supply (PMA) flows of Rp 260.3 trillion. With the expansion of industrial realization in Indonesia, the manufacturing sector looks more productive and has the potential to provide great economic benefits for the country.

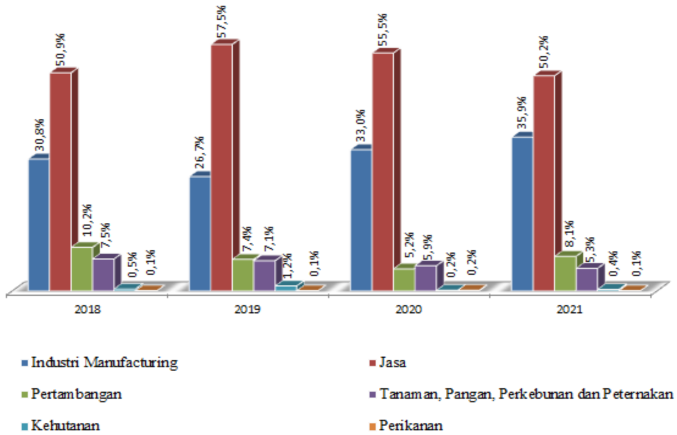

Figure 1. PMDN and PMA Sector Trends for 2018- September 2021
Source: BKPM, 2023

The primary consumer goods manufacturing industry sector involves companies producing and distributing goods with key characteristics that remain unaffected by economic growth. Examples include drugstores, grocery retailers, delicatessens, beverage manufacturers, packaged food manufacturers, supermarkets, agricultural sellers, cigarette manufacturers, home appliances, and personal care product manufacturers.

(Indonesia Stock Exchange, 2021) divides non-durable household products into two sub-sectors: household products (e.g., tissue paper, detergents, cleaning soaps, light bulbs, batteries, stationery) and personal care products (e.g., cosmetics, shampoos, detergents, deodorants, perfumes, skincare, toothpaste, toothbrushes, diapers, pads, cotton). Information, proceedings in the potential for bankruptcy at annual report is not disclosure, was recommended to the stakeholders to oblige any new issuers to give this information in the annual financial report made release every year. To be accurate information and credible the companies condition the truth (Prasetiyani & Sofyan, 2020).

The increasing demand for non-durable household goods results in fierce competition between businesses, which requires them to develop and maintain products or introduce new innovations. However, large funding and financing can create difficulties, particularly in finance, which can lead to bankruptcy if not managed properly. *Financial stress* is a critical issue for businesses, as it threatens their long-term survival. Early warning of financial difficulties helps identify and resolve problems before they reach critical conditions or lead to bankruptcy. (Brigham & Houston, 2018). Signals, as defined by (Brigham &; Houston, 2018) are managerial actions intended to inform investors about management performance. According to signal theory, the company's own words are included in the financial statements. The company's excellent profitability and liquidity are attractive to investors. If a company is large enough, its assets will be enough to cover all its liabilities. As a result, confidence among investors may increase.

The company must be aware of its financial condition just in case and take precautions to protect its assets and avoid bankruptcy. The risk of bankruptcy arises when the financial burden of the company exceeds its ability to meet it. Factors that increase the likelihood of a company filing for bankruptcy include poor management, unbalanced financial controls, low profitability, emergency situations such as natural disasters, and unstable economic conditions. Financial difficulties usually mark the beginning of the bankruptcy phase of the company. Financial analysis methods help monitor the financial condition of the enterprise and minimize bankruptcies.

Financial statement analysis has the primary objective of finding the most likely predictions and forecasts about future business performance. The Altman *Z"-Score* calculation , proposed since 1968, is a method used to determine whether a company is experiencing *financial distress* or bankruptcy by combining four commonly used ratios with different valuation weights. The equations were :

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

Note :
X1: Represents working capital divided by total assets
X2: Represents retained earnings divided by total assets
X3: Represents Profit before tax and interest divided by total assets
X4: Represents the Book Value of Capital divided by the book value of debt

Altman's Z"-Score *algorithm* comes from research on American manufacturing companies and companies from developing countries, such as Maxico. It combines four commonly used ratios with different valuation weights to predict financial difficulties. According to Spence's signal theory in 1973, a signal is an attempt by an information provider to precisely convey a problem to another party so that they can find a solution. Financial statements are critical to business success and can be used to assess a company's performance and financial health.

Financial difficulties are considered a negative indicator for investors, as companies experiencing financial difficulties can declare bankruptcy if not managed properly Financial statements not only reveal the department's bookkeeping efforts over a period of time, but also assess and identify the financial situation of the business as it develops. Financial statements serve as a means of decision making and communication with internal and external parties.

Based on the explanation above, the formulation of the problem to be studied in this study is how many companies in the Non-durable Household Product subsector are in the safe, gray and danger zones.

2. Research Method

This study uses quantitative descriptive analysis with Multivariate Discriminant Analysis *(MDA) analysis approach with a bankruptcy analysis model developed by Altman, namely the Altman* Z"-Score Model. (Hanafi &; Halim, 2018) Mentions in a *multivariate* approach the dependent variable in this model is the prediction of bankruptcy, while the independent variable is the financial ratio that is anticipated to have an impact on bankruptcy. Several common financial ratios are combined and given varying weights in the Altman method used to forecast the bankruptcy of a company (Prihadi, 2019) The research was conducted by Altman (1986), who also created the *Z"-Score* formula. Four ratios are used in Altman *Z"-Score*:

The Net Working Capital to Total Assets Ratio provides important information on how efficient a company is at managing its short-term assets to meet liabilities and maintain operational continuity. Using the Altman (*Z"-Score*) method, the effect of this ratio can be evaluated more comprehensively to help identify bankruptcy risk and monitor the adequacy of the company's working capital.

The retained earnings to Total Assets Ratio reflects a company's ability to retain profits generated from its operations and use it to strengthen its financial position through the accumulation of *retained earnings*. In the Altman (*Z"-Score*) method, the effect of this ratio is evaluated as one of the factors contributing to the assessment of bankruptcy risk and the financial stability of the company as a whole.

Earnings Before Interest and Taxes to Total Assets Ratio indicates the efficiency and profitability of a company's operations as well as the company's ability to generate sufficient cash flow. Measuring the profit of the company's assets through EBIT to *Total Assets Ratio* is important because it shows the company's ability to generate significant operating profit from its assets. In the context of the Altman (*Z"-Score*) method, this ratio provides insight into the profitability of the company and its effect on the predicted risk of bankruptcy.

Book Value of Debt Ratio provides information on the extent to which a company uses equity as a source of funding compared to its debt. This ratio is used to measure the proportion of a company's equity to debt used in company financing. This ratio helps in financial risk analysis and is used as a component in the calculation of the *Z"-Score* score to predict a company's potential bankruptcy.

The " *Z"-Score* method is divided into three types of zones which include the green zone or not bankrupt, meaning that the company can be categorized as healthy or the smallest possibility of the company going bankrupt. The second category is the gray zone (*Gray Area*) in this zone the company is difficult to determine whether it will go bankrupt or not, and the last is in the red zone or bankruptcy zone in this case the company is likely to fail fairly large or in other words, this score predicts failure.

Table 2. Cut-off Point in Altman Z"-Score Model

Cut-off *Point* in Altmant Z"-Score Model	
Score	Company Conditions
>2,60	Not bankrupt
1,1 – 2,60	Gray areas
<1,1	Bankrupt

Source: (Prihadi, 2019)

The population consists of 11 enterprises of the subsector of non-durable household products for the years 2016–2022, based on this criterion, obtained. *Purposive sampling*, which adapts a sample to components that produce information depending on consideration, is used to collect samples. The sampling standard consists of: (1) Companies listed on the IDX and included in the *Nondurable Household Products* category for the period 2016-2022 (not delisted during the research period); (2) The company's financial statements are presented in full. This criterion was chosen because to calculate the dependent variable, as well as independently all the necessary data are presented in the annual report. If there is incomplete data then it cannot calculate variables.

Based on these criteria, the sample results of 5 companies were obtained as follows:

Table 3. List of Company Research Samples

No	Company Code	Company Name
1	TCID	Mandom Indonesia Tbk.
2	MBTO	Martina Berto Tbk.
3	UNVR	Unilever Indonesia Tbk.
4	KINO	Kino Indonesia Tbk.
5	MRAT	Mustika Ratu Tbk.

Source: Prepare by author, 2023

3. Results And Discussion

From the results and analysis of *Z"-Score*, the results of the overall analysis are as follows:

Table 4. Recapitulation of Z"-*Score Results for 2016-2022*

No	Company Name	Year	*Z"-Score*	Increase/ Decline	Category	Average - 7 years	Category
1	PT Mandom Indonesia Tbk	2016	10,42		Not Bankrupt	9,82	Not Bankrupt
		2017	9,56	Decline	Not Bankrupt		
		2018	10,23	Increase	Not Bankrupt		
		2019	9,83	Decline	Not Bankrupt		
		2020	9,50	Decline	Not Bankrupt		
		2021	9,46	Decline	Not Bankrupt		
		2022	9,71	Increase	Not Bankrupt		
2	PT Martina Bento Tbk	2016	5,31		Not Bankrupt	0,79	Bankrupt
		2017	3,54	Decline	Not Bankrupt		
		2018	0,73	Decline	Bankrupt		
		2019	-0,09	Decline	Bankrupt		
		2020	-1,40	Decline	Bankrupt		
		2021	-1,36	Increase	Bankrupt		
		2022	-1,21	Increase	Bankrupt		
3	PT Mustika Ratu Tbk	2016	8,72		Not Bankrupt	7,05	Not Bankrupt
		2017	8,12	Decline	Not Bankrupt		
		2018	7,51	Decline	Not Bankrupt		
		2019	7,13	Decline	Not Bankrupt		
		2020	5,70	Decline	Not Bankrupt		
		2021	5,55	Decline	Not Bankrupt		
		2022	6,60	Increase	Not Bankrupt		
4	PT Kino Indonesia Tbk	2016	3,89		Not Bankrupt	2,92	Not Bankrupt
		2017	4,27	Increase	Not Bankrupt		
		2018	3,93	Decline	Not Bankrupt		
		2019	4,02	Increase	Not Bankrupt		
		2020	2,38	Decline	Gray Areas		
		2021	2,94	Increase	Not Bankrupt		
		2022	-0,99	Decline	Bankrupt		
5	PT Unilever Indonesia Tbk	2016	4,10		Not Bankrupt	3,20	Not Bankrupt
		2017	4,05	Decline	Not Bankrupt		
		2018	4,81	Increase	Not Bankrupt		
		2019	2,98	Decline	Not Bankrupt		
		2020	2,65	Decline	Not Bankrupt		
		2021	2,01	Decline	Gray Areas		
		2022	1,79	Decline	Gray Areas		

Source: Prepare by author, 2023

In the recapitulation of the *Z"-Score results above, PT Mandom Indonesia Tbk produced* a Z"-Score of the company over a seven-year period that looks stable with an average value of 9.82 which is the highest score of all companies. PT Mandom Indonesia Tbk is in the "Not Bankrupt" category throughout the observed period. There is a slight fluctuation in the *company's Z"-Score*, but it remains above the bankruptcy threshold. So it can be concluded that PT Mandom Indonesia Tbk in the next two years will be in the safe zone for investment.

PT Martina Bento Tbk has a *Z"-Score* result of the company which experienced significant fluctuations over a period of seven years. In 2018 to 2022, the company fell into the "Bankrupt" category. The company's average Z"-*Score* during the period was 0.79, which indicates the risk of bankruptcy in the next two years seen from the company's ability to use all variable *Z"-Score* ratios that are below the average of all companies engaged in the same field.

Z"-Score of PT Mustika Ratu Tbk also shows fluctuations over a seven-year period. However, the company remains above the bankruptcy threshold and is in the "Not Bankrupt" category. The company'*s average Z"-Score* during the period was 7.05 due to PT Mustika Ratu being able to generate working capital, retained earnings and being able to use all debt as a source of company funding well. So that the company in the next two years is still in the safe zone.

PT Kino Indonesia Tbk showed relatively stable Z"-*Score results with minor fluctuations over a seven-year* period. The company is above the threshold of bankruptcy and falls into the category of "Not Bankrupt". The company's average *Z"-Score* during the period was 2.92. This value is included in the low category among companies that fall into the other "Not Bankrupt" category.

This is due to the low *annual Z"-Score* value and in the last three years the company has been in a category that changes until 2022 the company is in the "Bankrupt" category. It can be categorized as a safe zone because the company is able to make improvements every time there is a decrease in the value of *Z"-Score in the* next year, so it can be predicted that PT Kino Indonesai Tbk in the next 2 years will be outside the bankruptcy zone.

PT Unilever Indonesia Tbk Z"-The company's score also fluctuated over a *seven-year* period, with an average score of 3.20 meaning it was in the "Not Bankrupt" zone. In 2021 and 2022, the company was included in the "Grey Zone" category, which indicates a higher risk of bankruptcy than the "Not Bankrupt" category due to a significant decrease in the entire ratio over the past two years but can still be categorized as safe because the Z"-Score value *is above the Z"-Score bankrupt value limit.* So it can be concluded that PT Unilever Indonesia Tbk in the next two years is categorized as safe for investment because it can still maintain the *Z"-Score* value well for the last seven years.

The analysis shows that PT Mandom Indonesia Tbk, PT Mustika Ratu Tbk, PT Kino Indonesia Tbk, and PT Unilever Indonesia Tbk tend to be stable in their financial performance, with a *Z"-Score* indicating that they are not at significant bankruptcy risk. However, PT Martina Bento Tbk shows significant fluctuations and has a higher risk of bankruptcy. Keep in mind that *the Z"-Score* is just one indicator in evaluating a company's financial risk, and a more in-depth and qualitative analysis needs to be done before making any significant investment or business decisions.

Table 5. Comparison of Average X1-X4 companies *of Nondurable Household Products Subsector* 2016-2022

Ratio	X_1	X_2	X_3	X_4
The average value of the entire company	20%	28%	9%	185%
PT Mandom Indonesia Tbk	49%	67%	4%	391%
PT Martina Berto Tbk	11%	-14%	-12%	125%
PT Unilever Indonesia Tbk	-23%	26%	47%	65%
PT Kino Indonesia Tbk	13%	19%	2%	123%
PT Mustika Ratu Tbk	50%	42%	1%	219%

Source: Prepare by author, 2023

In Table 5, it can be seen that PT Mandom Indonesia Tbk has a higher than average X1 and X2, showing good performance in terms of *net working capital* and *retained earnings*. However, a lower-than-average X3 may indicate a lower rate of return. In addition, a much higher-than-average X4 shows a high equity ratio compared to debt.

PT Martina Berto Tbk has all ratios lower than average, indicating weaker performance in terms of net working capital, *retained earnings*, EBIT, and *book value of equity* compared to other companies' averages. PT Unilever Indonesia Tbk has a lower than average X1, indicating poor *net working capital* management. A lower-than-average X2 indicates *poor retained earnings*. However, a higher-than-average X3 may indicate a higher rate of return. A lower-than-average X4 indicates a low ratio of equity compared to debt.

PT Kino Indonesia Tbk has all ratios lower than average, indicating weak performance in terms of *net working capital,* retained earnings*, EBIT, and* book value of equity compared to other company averages. And PT Mustika Ratu Tbk has a higher than average X1 and X2, showing good performance in terms of *net working capital* and *retained earnings*. However, a lower-than-average X3 may indicate a lower rate of return. X4 which is much higher than average shows a high equity ratio compared to debt.

From the explanation above, it can be concluded that the rise and fall *of the company's Z"-Score* value is influenced by four variables, namely X1 describes the ratio of working capital, X2 and X3 which describes the ratio of operating profit and X4 which describes the ratio that measures the company's ability to pay debt. An increase in each ratio results in *a high Z"-Score, while a low ratio value produces a low* Z"-Score . However, not all increases in each ratio result in *a high Z'-Score, this happens because the value of each ratio fluctuates so that it produces a* different *Z'-Score*.

A higher Z-score indicates a higher level of financial security, while a lower Z"-score may indicate a higher risk of bankruptcy. This is in accordance with signal theory which assumes that companies that have good financial performance will send positive signals to investors and creditors.

4. Conclusion

This study aims to determine and analyze bankruptcy predictions using the Altman (*Z"-Scored*) method study on *Nondurable Household Products subsector companies* listed on the Indonesia Stock Exchange in 2016-2022. The results of the research that has been carried out can be concluded as follows:

Four of the five sample companies in the study are not bankrupt or in a safe position. These companies are PT Mandom Indonesia Tbk, PT Mustika Ratu Tbk, PT Kino Indonesia

Tbk and PT Unilever Indonesia Tbk. One of the five companies, PT Martina Berto Tbk, is included in the bankruptcy zone.

Companies with X1 values above the average are PT Mandom Indonesia Tbk and PT Mustika Ratu Tbk, while PT Martina Berto Tbk and PT Kino Indonesia Tbk are below the average of all companies but can still use working capital well. Meanwhile, PT Unilever Indonesia Tbk is below the average of all companies.

Companies with X2 values above the average are PT Mandom Indonesia Tbk and PT Mustika Ratu Tbk, while PT Unilever Indonesia Tbk and PT Kino Indonesia Tbk are below the average of all companies but still able to generate good retained earnings. Meanwhile, PT Martina Berto Tbk cannot generate retained earnings properly.

PT Unilever Indonesia Tbk has the highest use of X3 ratio from the average of all companies engaged in the same field, but PT Mandom Indonesia Tbk, PT Kino Indonesia Tbk and PT Mustika Ratu Tbk are below average but still able to generate good operational profits. Different from Martina Berto Tbk who has not been able to produce a good X4 ratio for the last seven years.

Companies with the highest use of X4 ratio are PT Mandom Indonesia Tbk and PT Mustika Ratu Tbk which are above the average of all companies, while PT Martina Berto Tbk, PT Unilever Indonesia Tbk and PT Kino Indonesia Tbk are below the average of all companies but are still able to use all equity rather than debt in company financing.

Based on the analysis, discussion, conclusions and limitations of this study, the following suggestions can be put forward:

Further research is encouraged to expand their research topics beyond non-durable household product companies listed on the Indonesia Stock Exchange. It is recommended to include enterprises from different industries such as mining, agriculture, basic and chemical industries and other industries.

Researchers are further advised to extend the observation period to ensure more consistent bankruptcy predictions using the Altman *Z"-Score method*.

Future researchers should consider using methods other than the Altman *Z"-Score* to predict corporate bankruptcy.

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