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Comparison of Altman Z-Score Model and Springate Model in Predicting Financial Distress: Case Study of FMCG Companies in Indonesia

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Abstract

Financial distress is a serious threat to the sustainability of a company. This study aims to evaluate the ability of the Altman Z-Score model and the Springate model in predicting the possibility of financial distress in FMCG companies. By comparing the performance of the two methods, this study is expected to provide recommendations for the most appropriate method to use in monitoring the company's financial health. The results of this study have important implications for investors, creditors, and company management in making investment and risk management decisions.

keyword: *Financial Distress, Logistic Regression, Altman Z-Score, Total Assets*

1. Introduction

FMCG companies are companies engaged in the food and beverage manufacturing industry. However, 2021 is a time when the global economic recovery is recovering (Mohan & Squeira, 2016; Azamat et al. 2023). Although the COVID-19 pandemic began in 2020, its impact on the world economy was still felt in 2021. Many countries continued fiscal and monetary stimulus to recover the economy from recession due to lockdowns. The impact of COVID-19 is the disruption of global supply chains such as production stoppages in various regions, border closures, and transportation restrictions that cause scarcity of raw materials. Therefore, companies must be able to survive and be able to compete, because if the company is unable to survive, it will make the company's finances unhealthy and the worst thing that will happen is bankruptcy.

The establishment of a business is based on continuous business growth. This growth can be supported by increasing profits in each period (Kirchhoff, 1993; Raisch, 2008). Likewise, the sustainability of a company is also very dependent on its financial condition. One of the risks faced by companies is the occurrence of financial distress, which is a condition in which the company is experiencing significant financial difficulties and has the potential to go bankrupt. Financial distress according to Karen Wruck in Ahmad Rodoni (2014: 185) is a situation where the company's operating cash flow is insufficient to meet the company's obligations (such as trade credit or interest costs) and the company is pressured to carry out repair activities. One strategy that can be used in maintaining a business is to predict the possibility of financial distress in the company.

One method that can be used to predict financial distress is through financial analysis. Drake (2007) describes financial analysis as a selection, evaluation, and interpretation of financial data, as well as connecting with other information intended to assist investment and financial decisions. One of the information generated from financial analysis is the acquisition of financial ratios. Financial ratios according to Aksoy and Ugurlu (2016) can describe the company's financial performance that actually occ

Models that can be used in predicting financial distress are the Altman Z-Score model and the Springate model. The Altman Z-score model and the Springate model are used to predict the possibility of bankruptcy of a company and indicate it with a score. However, with differences in the selection of variables and coefficients used.

2. Literature Review

2.1. Financial distress

Financial distress is a condition of financial difficulty experienced by a company. This financial difficulty includes limited cash for the company's normal operating activities until the delay and cessation of payment of the company's maturing and maturing obligations. Beaver, et al (2011) in Dwijayanti (2010: 103) defines financial distress as the company's inability to pay maturing financial obligations. Meanwhile, according to Brigham and Daves (2003) in Hidayat and Meiranto (2014: 2) financial distress occurs as a result of a series of inappropriate decision making, lack of supervision of financial conditions and several interrelated weaknesses so that their use is not in accordance with what is needed.

2.2. Financial Ratio

Financial ratios are statistical measures related to two numbers from the income statement, balance sheet or both (Halim, et al 2012 in Mujani. 2012: 3). One of the objectives of financial ratio analysis is as an analytical tool to identify the strengths and weaknesses of a company intended to access viability and determine a satisfactory return that will result from taking risks.

2.3. Altman Z-Score Model

The Altman Z-Score model is a multivariate analysis instrument used to classify companies based on the potential for financial distress. This model utilizes a combination of several relevant financial ratios to produce a Z-score. The Z-score obtained is then compared with a certain threshold value to determine whether the company is in the safe zone, gray zone, or distress zone. While the Altman Z-Score is a powerful tool for predicting bankruptcy, it is important to consider other qualitative factors and market conditions that can also affect a company's financial stability.

The first Altman model formula:

$$Z = 1.2\,X_1 + 1.4\,X_2 + 3.3\,X_3 + 0.6\,X_4 + 1.0\,X_5$$

with

$$X_1 = Working\ Capital\ to\ Total\ Assets$$

Measures liquidity by comparing net liquid assets to total assets. Net liquid assets or working capital is defined as current assets minus total current liabilities.

$$X_2: Retained\ Earnings\ to\ Total\ Assets$$

This ratio measures the amount of a company's ability to earn profits, in terms of the company's ability to earn profits compared to the speed of turnover of operating assets as a measure of business efficiency or in other words, this ratio measures the accumulation of profits during the company's operation.

$$X_3: Earning\ Before\ Interest\ Tax\ to\ Total\ Assets$$

This ratio measures the return on assets, which is calculated by dividing the company's annual earnings before interest and tax by total assets on the year-end balance sheet.

$$X_4: Market\ Value\ of\ Equity\ to\ Total\ Liabilities$$

The value of own capital in this ratio is the market value of own capital, namely the number of shares of the company multiplied by the stock market per share.

X_5: *Sales to Total Assets*

This ratio measures management's ability to use assets to generate sales which is the core operation of the company to be able to maintain its survival.

The score should be compared to the following scoring standards:

Z-score < 1.81 means distress zone.

A Z-score between 1.81 and 2.99 means gray zone.

Z-score > 2.99 means safe zone.

Model Springate

The Springate model is quoted from Rhomadhona (2014), that the Springate model was introduced by Gordon L.V. Springate in 1978. This model is a development of the Altman model and this model was developed with Multiple Discriminant Analysis (MDA). Initially, this model used 19 popular financial ratios but after testing Springate finally chose 4 ratios that were used to determine whether the company was a healthy or bankrupt company. This model has an accuracy of 92.5% using 40 companies as samples used by Springate.

$$S = 1.03A + 3.07B + 0.66C + 0.44D$$

with

S: *Indeks Springate*

A: *Working capital to Total assets*

B: *Earning Before Interest and Taxes to TotalAssets*

C: *Earning Before Taxes to Current Liabilities*

D: *Sales to Total assets*

Measures the liquidity of the company. High working capital indicates that the company has enough current assets to meet its short-term liabilities.

Measures the efficiency of using assets to generate profits. A higher ratio indicates that the company is able to generate good profits from its assets.

Indicates the company's ability to cover its current liabilities with profits generated. This ratio is important for assessing short-term solvency.

It indicates how efficiently the company uses its assets to generate sales. A high ratio indicates effectiveness in asset management.

The cut off value of the Springate model is 0.862, so it can be interpreted as follows:

a) If the S index value is more than 0.862 (> 0.862), then the company is classified as not indicated as experiencing financial distress.
b) If the S index value is less than 0.862 (<0.862), the company is classified as indicated as experiencing financial distress.

3. Materials and Methods

3.1. Materials

The model used to determine whether the company will be in financial distress using the Altman Z-Score model and the Springate model.

3.2. Methods

The object of this research is FMCG companies listed on the Indonesia Stock Exchange. Companies listed on the IDX are used because these companies have an obligation to submit annual financial reports (annual reports) to external parties of the company, thus allowing the data to be obtained and accessed for the purposes of this study. The period used to observe and analyze the ratio during the period 2021-2023.

3.2.1. Structure

This research article is divided into several main sections: Introduction, Literature Review, Materials and Methods, Results and Discussion, Conclusion, and Bibliography.

3.2.2. Formula

The first Altman equation model:

$$Z = 1.2\,X_1 + 1.4\,X_2 + 3.3\,X_3 + 0.6\,X_4 + 1.0X_5$$

Model equation of the Springate Model:

$$S = 1.03A + 3.07B + 0.66C + 0.44D$$

3.2.3. Tables

Table 1: Variable Calculation Results for Altman Z-Score Model

Company	X1	X2	X3	X4	X5
PT Indofood CBP	0.308329	0.286006	0.120633	1.086438	0.569393
PT Unilever Indonesia Tbk	-0.301967	0.192566	0.376815	0.254557	0.2317043
PT Sinar Mas Agro and Technology Tbk	0.224487	0.410742	0.064666	0.923852	1.675169
PT Mayora Indah Tbk	0.449331	0.611847	0.211558	1.779405	1.318998

Tables 1 is the result of the calculation of the variables needed to continue the Altman Z-Score modeling of FMCG companies that have been selected based on annual report data in 2023.

Table 2: Variable Calculation Results for the Springate Model

Perusahaan	A	B	C	D
PT Indofood CBP	0.308329	0.120633	1.181446	0.569393
PT Unilever Indonesia Tbk	-0.301967	0.376815	0.542079	2.317043
PT Sinar Mas Agro and Technology Tbk	0.224487	0.064666	0.192047	1.675169
PT Mayora Indah Tbk	0.449331	0.211558	1.182947	1.318998

Tables 2 is the result of the calculation of the variables needed to continue Springate modeling of FMCG companies that have been selected based on annual report data in 2023.

3.2.4. Construction of references

Financial Distress Prediction Using the Altman Z-Score Approach in the Cement Industry Listed on the Indonesia Stock Exchange (Fitriani et al. 2019). STIE Y.A.I.

4. Results and Discussion

Table 3: Comparison of Calculation Results of Altman Z-Score and Springate Models

Company	Score Model			
	Altman Z-Score	Interpretation	Springate	Interpretation
PT Indofood CBP	2.39	Gray Zone	1.69	Not FD
PT Unilever Indonesia Tbk	3.62	Safe Zone	2.13	Not FD
PT Sinar Mas Agro and Technology Tbk	3.29	Safe Zone	1.23	Not FD
PT Mayora Indah Tbk	4.48	Safe Zone	2.42	Not FD

Tables 3 is the result of the calculation of the Altman Z-Score model and its interpretation and the Springate model and its interpretation using the annual report data of the FMCG companies that have been selected in 2023.

5. Conclusion

The selected FMCG companies have gone through the calculation process of the various variables involved in the calculation of the Altman Z-Score model and the Springate model. It can be concluded that in the calculation of the Altman Z-Score model, the Indofood CBP company is indicated to be in the gray zone, which means that the company's probability of bankruptcy is quite risky, while other companies are still in the safe zone, which means that the company has a small probability of bankruptcy. But the calculation in the Springate model states that there are no companies that are indicated to experience bankruptcy.

This is the cause of the difference in variables and coefficients used in the calculation of the two models. The Altman Z-Score model includes retained earnings with a considerable influence on the calculation results, while Springate is a development of the Altman model that eliminates the retained earnings variable. The results of the calculation using the Springate model state that PT Sinar Mas Agro and Technology Tbk has a fairly low value. This is enough to be used as a reason to improve the financial condition that occurs in the company PT Sinar Mas Agro and Technology Tbk.

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