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Analysis of Potential Financial Distress Using the Altman Method (Z-Score), Springate Method (S-Score), and Zmijewski Method (X-Score) in Food and Beverage Companies Listed on the Indonesia Stock Exchange in 2019-2022

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ABSTRACT:

This study aims to find out whether there is a score difference between Altman, Springate, and Zmijewski's methods in predicting Financial Distress, as well as to find out which prediction model is the most accurate in predicting Financial Distress in manufacturing companies in the food & beverage subsector. The data used in this study is the company's financial statements published on the Indonesia Stock Exchange. The sample in this study is 6 food and beverage companies listed on the Indonesia Stock Exchange for the 2019-2022 period. The sampling technique using nonprobability sampling is purposive sampling. This study compares the scores of three financial distress prediction models using the accuracy of the prediction model by considering the level of accuracy and type of error. The results of this study show that there is a difference between the three prediction models. Zmijewski's model is the best with an accuracy rate of 1% and an error type of 0%, the second is the springate model with an accuracy rate of 0.958% and an error type of 0.041%, and the last is the Altman model with an accuracy rate of 0.083% and an error type of 0.916%.

Keywords: Financial Distress, Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), Food and Beverage

I. INTRODUCTION

The growth of the food and beverage industry was severely hampered during the corona pandemic (Covid-19). Industry players also really hope that the government can encourage consumption in the community by accelerating the existing coming from government stimulus to stimulus. The potential of the community by providing direct cash assistance, worker incentives and other assistance. As for social restrictions, aka PSBB, (Fernado et al., 2021; Fernando et al., 2022a, 2022b)in the first period food & beverage sales at the retail level were recognized as plummeting. Because the policy reduces people's operational hours in carrying

out activities, it is difficult for people to buy necessities and carry out activities in accordance with the operational hours that have been regulated by the government (Rohyana & Arrahman, 2022).

The Covid-19 pandemic has impacted several industries, including food and beverages. Although the growth of this industry is still positive, it is still far from normal. The weakening purchasing power of the lower middle class and the tendency of the upper class to limit consumption during the pandemic have made this industry sluggish (Peng et al., 2018). In addition to weak public consumption, there are also bureaucratic problems in the food and beverage industry. Convoluted import permits make it difficult to obtain raw materials. However, the food and beverage industry also experiences a number of challenges because people's purchasing power has decreased drastically due to the decline in the economic conditions of the people affected by the pandemic (Armadani et al., 2021).

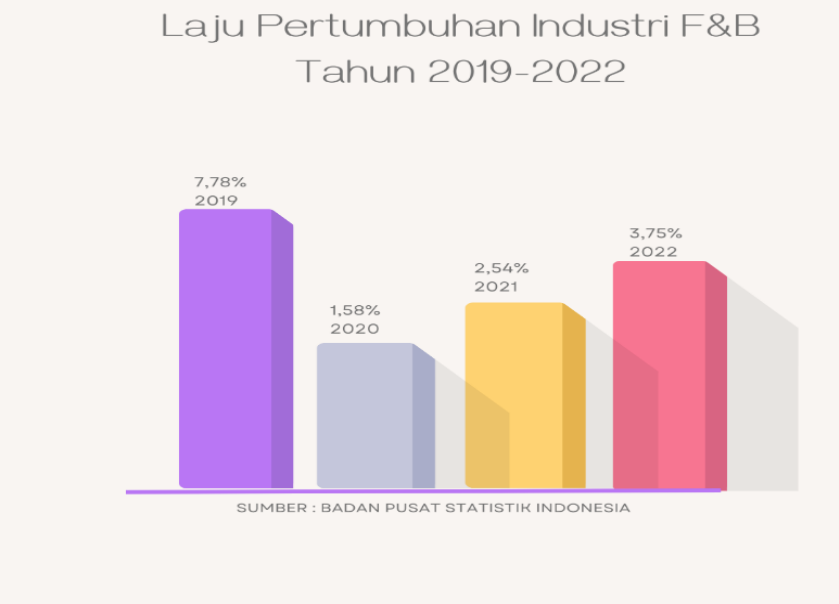

Figure 1. Food & Beverage Industry Growth Data (2024)

Based on the above background, the formulation of the problem in this study is as follows

a. Is there a score difference between the Altman method (Z-Score), the Springate method (S-Score), and the Zmijewski method (X-Score) in predicting potential financial distress in food and beverage companies listed on the Indonesia Stock Exchange (2019-2022)?
b. Is there the most accurate model between the Altman method (Z-Score), the Springate method (S-Score), and the Zmijewski method (X-Score) in predicting potential financial distress in food and beverage companies listed on the Indonesia Stock Exchange (2019-2022)?

The purpose of this study is to analyze the potential for financial distress in 6 samples of food and beverage companies listed on the Indonesia Stock Exchange in 2019-2022. To find out which method is the most accurate in predicting potential financial distress in 6 samples of food and beverage companies listed on the Indonesia Stock Exchange in 2019-2022.

Benefits of research, Theoretical Benefits For the University, It is hoped that this research can contribute to additional knowledge, especially for Financial Management as well as become reading material in the University library and can provide a reference for other students. For Researchers, This research can be used to understand and increase insight into the theories

that have been obtained from lectures which are applied in the business world, especially financial management.

Practical Benefits For Industry, This research provides information regarding bankruptcy predictions which can be used as reference material and consideration for internal decision making. For Further Researchers , Can be a useful scientific work to increase knowledge regarding the potential bankruptcy of a company and It is hoped that this research can be used as consideration and reference for conducting further research regarding the potential for financial distress in a company (Wiwit Cahyatil Chasanah, 2020).

II. LITERATURE REVIEW

Financial distress is a situation where a company has difficulty meeting its obligations, a situation where the company's revenue cannot cover the total costs and suffers losses. Financial distress It is a situation when a company is unable to fulfill its obligations (Kemala Octisari et al., 2022). This happens as an early sign before the worst can happen in the end, namely bankruptcy. Financial distress not only damages the company's financial system, but also the organization as a whole (Prayoga & Titik Aryati, 2023). The loss of the company's financial resources and human resources can cause the company to be liquidated (Yosandra & Sembiring, 2022). Financial distress As a problem that occurs in the company's liquidity, it is difficult to overcome if there is no right management decision so that in the end it can occur to the stage of bankruptcy (Triyono & Ahmar, 2024).

A. Altman (Z-Score)

Altman's method was developed by Altman in 1968 using regression analysis techniques, but its uses vary, including Multiple Discriminant Analysis (MDA) (Dewi et al., 2022). According to Altman, although the MDA technique is not as popular as it is used to predict the bankruptcy of a company, it is a statistical technique by observing and grouping based on certain characters. The advantage of using this technique is that it can reduce the scope of the analysis to a few independent variables.

Discrimination function of the Altman model (Z-Score):

Z-Score = 0,717X1 + 0,874X2 + 3,107X3 + 0,420X4 + 0,998X5

Altman Z-Score criteria :

1. Companies with a Z score of > 2.9 are classified as company in "Safe" condition.
2. Companies with a score of 1.23 <Z< 2.9 are classified as "Grey Area"
3. Furthermore, the Z score < 1.23 is classified as the "Distress" zone.

B. Springate (S-Score)

Springate was developed in 1978 by selecting 4 financial ratios out of 19 ratios that can predict the occurrence of bankruptcy in the company. The financial ratios chosen by Springate, then combined in linear, will form a mathematical equation that can be used in predicting the bankruptcy of a company (Yosandra & Sembiring, 2022).

The equation of the bankruptcy index generated by the Springate method can be expressed as follows:

S-Score = 1,03X1+ 3,07X2+ 0,66X3 + 0,4X4

Springate S-Score criteria:

1. Companies with an S score of > 0.862 are classified as companies in the "Safe Zone" condition.
2. Companies with an S score of < 0.862 are classified as companies in the "Distress Zone" condition.

C. Zmijewski (X-Score)

According to Zmijewski, it was developed in 1984 using a random sampling technique. It took twenty years for Zmijewski to create this method. In this method, to obtain the size of bankruptcy, the proportion of the sample and the population must be determined in advance (Triyono & Ahmar, 2024). The accuracy rate of this method reaches 94.6%. Here is the equation of Zmijewski's method:

X-Score = -4,3 – 4,5X1 + 5,7X2 – 0,004X3

Zmijewski X-Score criteria:

1. If the value of X < 0 then the company is predicted to be a healthy company (not potentially bankrupt).
2. If the value of X > 0, the company is predicted to be an unhealthy company or potentially bankrupt.

III. METHODS

The research method uses a quantitative approach, with a comparative nature. Comparative research was used to determine the comparison of prediction models, namely the Altman method (Z-Score), the Springate method (S-Score), the day of the Zmijewski method (X-Score) (Adriansyah, 2020) to find out the potential financial distress and determine the level of accuracy between models financial distress aforementioned (Nasri et al., 2020) . The secondary data source obtained by the researcher was from the financial reports of 6 food & beverage companies listed on the Indonesia Stock Exchange for the 2019-2022 period which were used as samples in this study. The population in this study is 47 companies (Goestjahjanti et al., 2023), but the sample in this study is 6 companies based on certain criteria. The data collection method in this study is documentation, which is data collection by collecting and analyzing documents, both written, pictures, and electronic. Data analysis using the help of the SPSS program with version 26.0

Table 1 Companies Used as Samples

No	CODE	Company Name
1.	ICBP	PT. Indofood CBP Sukses Makmur Tbk.
2.	MYOR	PT. Mayora Indah Tbk
3.	GOOD	PT. Garudafood Putra Putri Jaya Tbk.
4.	ROTI	PT. Nippon Indosari Corpindo Tbk.
5.	CLEO	PT. Sariguna Primatirta Tbk.
6.	STTP	PT Siantar Top Tbk

The hypothesis in this study is as follows:

H0: There is no difference in scores between the Altman method (Z-Score), the Springate method (S-Score), and the Zmijewski method (X-Score) in predicting potential financial distress in food and beverage companies listed on the Indonesia Stock Exchange (2019-2022).

Ha: There is a score difference between the Altman method (Z-Score), the Springate method (S-Score), and the Zmijewski method (X-Score) in predicting potential financial distress in food and beverage companies listed on the Indonesia Stock Exchange.

IV.RESULTS

A. Descriptive Statistics

Table 1. Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Altman	24	1,3	3,1	2,336	,4888
Springate	24	,601	2,043	1,32575	,376516
Zmijewski	24	-3,0	-1,3	-2,200	,4462
Valid N (listwise)	24				

Based on Table 1. It can be seen that the number of data used in this study is 24 data. The Altman method (Z-Score) has a minimum value of 1.3 and a maximum value of 3.1 and a mean value of 2.336 with a standard deviation of 0.4888. The minimum score of 1.3 is owned by PT. Indofood CBP Sukses Makmur Tbk in 2021. Then the maximum score of 3.1 is owned by PT. Indofood CBP Sukses Makmur Tbk in 2019.

The Springate method (S-Score) has a minimum value of 0.601 and a maximum value of 2.043. The mean value of Springate (S-Score) is 1.32575 with a standard deviation of 0.376516. The minimum value of 0.601 is owned by PT Sekar Bumi Tbk in 2019. Then the maximum value of 2,043 was owned by PT Indofood CBP Sukses Makmur Tbk in 2019.

The Zmijewski method (X-Score) has a minimum score of -3.0 and a maximum score of -1.3. The mean value of Zmijewski (X-Score) is -2,200 with a standard deviation of 0.4462. The minimum value of -3.0 is owned by PT Indofood CBP Sukses Makmur Tbk in 2019. Then the maximum value of -1.3 is owned by PT Garudafood Putra Putri Jaya Tbk in 2020.

B. Normality Test

Table 2. Normality Test

One-Sample Kolmogrov-Smirnov Test

		Altman	Springate	Zmijewski
N		24	24	24
Normal Parametersa.b	Mean	2,336	1,32575	-2,200
	Std. Deviation	,4888	,376516	,4462
Most Extreme Differences	Absolute	,134	,088	,086
	Positive	,092	,088	,086
	Negative	-,134	-,081	-,062
Test Statistic		,134	,088	,086
Asymp. Sig. (2-tailed)		,200c.d	,200c.d	,200c.d

Based on Table 2. Above it can be known the significance value of the three. The financial distress model is Altman method (Z-Score) is 0.200, Springate method (S-Score) is 0.200, and Zmijewski method (X-Score) is 0.200. All three have a significance value of 0.200 > 0.05 which means that the data is normally distributed (Usmadi, 2020).

C. Paired Sample T-Test

Tabel 3.Paired Sample Test

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1 Altman - Springate	1,010042	,376310	,076814	,851140	1,168943	13,149	23	,000
Pair 2 Altman - Zmijewski	4,5357	,8224	,1679	4,1885	4,8829	27,020	23	,000
Pair 3 Springate - Zmijewski	3,525658	,660479	,134820	3,246763	3,804554	26,151	23	,000

Based on Table 3. The results of the SPSS calculation show that the value of Sig. (2-tailed) in pair 1, namely between the score of the Altman and Springate methods, is 0.000. In pair 2, which is between Altman and Zmijewski's method, it is 0.000. In pair 3, which is between Springate and Zmijewski, it is 0.000. The results showed a probability of 0.000 < 0.05 which means that there was a significant difference between the two sample groups. From these results, it can be concluded that Ha was accepted and H0 was rejected (Waluyo edy, 2024).

V. CONCLUSION AND DISCUSSION

This study was conducted to predict financial distress and measure the level of accuracy in 6 food and beverage companies sampled in this study for the 2019-2022 period using three financial distress prediction models, namely Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score). Based on the results of the research that has been carried out, it can be concluded that:

A. The results of the calculation between the three financial distress prediction models are: Altman method (Z-Score), Springate method (S-Score), and Zmijewski method (X-Score) using the paired sample t-test The results showed a probability or sig value (2-tailed) of 0.000< 0.05 which means that there was a significant difference between the two sample groups. This can also be seen from the calculation in figure 4. It shows that the score results using the three financial distress prediction models show that there is a difference in the score results obtained from the three financial distress prediction models.

1. Based on the calculation of the Altman model financial distress prediction (Z-Score), it was concluded that from the 24 samples studied, 22 samples were predicted to be in the gray area category and 2 samples were in a safe condition or did not experience financial distress.
2. Based on the calculation of the Springate model (S-Score) on the 24 samples studied, the results showed different results from the previous model, where the results of this model predicted that there was 1 sample that was predicted to experience financial distress and the remaining 23 samples were in good health or did not experience financial distress.
3. Based on the calculation of the potential financial distress of the Zmijewski model (X-Score), in 24 samples it is predicted that no food and beverage company will experience financial distress and this is in accordance with the fact that no such company will experience bankruptcy.

This means that this model can analyze the potential for financial distress well.

B. The results of this study show that from the three financial distress models , namely Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score) in food and beverage companies sampled for the 2019-2022 period, it can be concluded that the Altman model (Z-Score) has an accuracy level of 0.083% and an error type of 0.916%, while the accuracy level of the Springate model (S-Score) is 0.958% and an error type of 0.416%. The Zmijewski model (X-Score) has an accuracy rate of 1% and an error type of 0%. This shows that Zmijewski's model is the most accurate model in this study.

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