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MEASURING THE BANKRUPTCY POTENTIAL OF ACEH BEGINNERS WITH THE ALTMAN Z-SCORE, SPRINGATE, OHLSON, GROVER, AND ZMIJEWSKI METHOD IN THE MIDST OF THE COVID-19 PANDEMIC

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ABSTRACT

This study uses the Altman Z Score, Springate, Ohlson, Grover, and Zmijewski methods to measure the potential for bankruptcy for Aceh beginner entrepreneurs registered with the Cooperatives, Small and Medium Enterprises Office in 2022. The purpose of this study is to analyse and test whether there are differences in the calculation results between Altman, Springate, Ohlson, Grover, and Zmijewski methods when used to predict the bankruptcy of business actors in 2022, as well as the most accurate method in predicting the bankruptcy of businesses registered as SMEs in 2022. The population used in this study is all Aceh beginner entrepreneurs registered in the Department of Cooperatives, SMEs in 2022, selected with certain criteria using the objective sampling method. The data in this study is quantitative data with survey data sources, namely secondary from the Annual Financial Reports published by the Cooperatives and SMEs Office in 2022. The data acquisition technique uses documentation techniques. The data analysis method used descriptive statistical methods, normality tests, and hypothesis testing using a paired sample t-test to test the accuracy of the method. The data analysis method used descriptive statistical techniques, normality tests, hypothesis testing with paired sample t-test and accuracy of prediction methods. The results obtained showed that there were significant differences between the methods of Altman, Springate, Ohlson, Grover, and Zmijewski, and there were methods with the highest level of accuracy, namely the Grover model of 90.17%.

Keywords: *Bankruptcy Potential of Aceh Beginners, Altman Z-Score, Springate, Ohlson, Grover, and Zmijewski*

INTRODUCTION

At the beginning of 2020, the world was shocked by events that made people in various countries restless with the emergence of a new type of virus, namely the Corona Virus which was increasingly spreading until 2022. So that the implementation of PSSB, especially in Aceh, became one of the inhibiting factors for economic growth, so in responding to this the government Aceh through the Department of Cooperatives, SMEs open registration for Aceh's beginner entrepreneurs, namely job seekers / layoffs or do not yet have a job by providing working capital assistance. However, the provision of capital must be balanced with knowledge because not all startup businesses always run well, sometimes they experience confusion, merchandise is sold out but there is no visible profit or additional income for their family. Business capital that should be able to be turned over to grow a business is not infrequently used up to buy daily household needs. (1) Therefore, in order for businesses to anticipate bankruptcy, novice entrepreneurs need to analyze the potential for bankruptcy by analyzing financial statements. (2) Many Micro, Small, Medium Enterprises fail in business management or management so that productivity decreases leading to losses, even bankruptcy.

According to Ria Effendi Bankruptcy of a company is a condition where a company is no longer able to run its business. (2) There are various models to analyze the potential for bankruptcy, but in this research, five methods are taken, namely Altman Z-Score, Springate, Ohlson, Grover and Zmijewski. In the five studies that have been done previously, the results of different levels of accuracy.

The method of calculating bankruptcy predictions needs to be developed and continued, because knowing the results of predictions about business conditions from an early age is expected to be useful and used as a reference for decision making regarding business strategies and to anticipate or prevent novice entrepreneurs from going bankrupt. Here are some prediction methods such as the Altman Z-Score Method, Springate, Ohlson, Grover, Zmijewski and there are other than the five methods that are rarely used. Research on bankruptcy prediction has often been done in Indonesia. In general, the use of Altman Z-Score is often used while other methods or models are few and limited.

Based on the description of the background described above, it makes researchers interested in testing which of the five methods are accurate and appropriate to be applied in Indonesia with the title

"Measuring the Bankruptcy Potential of Aceh Beginners with the Altman Z-Score, Springate, Ohlson, Grover Method. and Zmijewski in the midst of the Covid-19 Pandemic".

LITERATURE REVIEW

Bankruptcy

Bankruptcy is referred to as a condition where a company is unable to pay off a number of obligations that are already due, this is one of the causes of bankruptcy or liquidity difficulties as an early symptom of bankruptcy. Neneng Susanti stated that bankruptcy means the company is no longer able to pay off its obligations. This condition usually does not just appear in the company, there are early indications of the company which can usually be recognized earlier if the financial statements are analyzed more carefully in a certain way. (3) According to Putri Risnanti, bankruptcy is a company experiencing a shortage or insufficient condition funds, so that the company is no longer able to pay its obligations and causes it to be unable to run or continue its business is called a bankruptcy condition. (4)

Based on some of the definitions above, it can be concluded that Bankruptcy is the highest level of financial distress where the company is unable to operate normally which is marked by the company's inability to fulfill its obligations caused by the company's failure to generate profits so that business continuity cannot be carried out. There are many methods to predict the bankruptcy of a company. There are a number of methods created by several experts in the world. The models are:

Altman Models (Z-Score)

Altman introduced the Z-Score method in 1968. Altman used this analysis, which is a multivariable equation, to predict the bankruptcy rate. Altman employs a statistical technique known as multiple discriminatory analysis (MDA). (5) According to Xiping Li, the z-score is used in the literature on bank governance to assess the relationship between bank risk and capital regulations, deposit insurance, and other regulatory policies. (6) Initially, Altman identified a list of 22 possible ratios that he believed would be more accurate in predicting future business crises based on empirical tests. Such ratios were further subdivided into five macro classes, each capable of providing comprehensive information about a company's various structural dimensions: liquidity, profitability, leverage, solvency, and invested capital. Finally, Altman chose the five best performing ratios after numerous tests because of their ability to predict potential future failures when used together.

Springate models

Gordon L.V Springate (1978) conducted research that resulted in a bankruptcy prediction model created using the Altman model procedure. The Springate model, a bankruptcy prediction model, employs four financial ratios chosen from among 19 financial ratios found in various literatures. (8) Springate uses multi discriminant analysis to select 4 ratios from 19 ratios, the sample taken by Springate is 40 companies. The model found by Springate has an accuracy rate of 92.5%, the formula that has been found by Springate is:(9)

$$\mathbf{S = 1.03X_1 + 3.07X_2 + 0.66X_3 + 0.4X_4}$$

Note:

X_1 = *Working Capital / Total Asset*
X_2 = *Net Before Interest and Taxes / Total Asset*
X_3 = *Net Profit Before Taxes / Current Liabilities*
X_4 = *Sales / Total Asset*

With the following assessment criteria:

a. If the S-score obtained > 0.862, it can be said that the company is healthy (not bankrupt).

b. Meanwhile, if the S-score obtained < 0.862 then the company is said to be unhealthy (potentially bankrupt).

Ohlson models

The mathematics underlying the Ohlson model has been extensively described in the literature. A satisfactory Ohlson model satisfies the dividend discount model (DDM), the clean surplus accounting relationship (CSR), and the linear information dynamics (LID). Based on these three fundamental assumptions, a linear closed form valuation equation produces a market value, which equals a book value plus a linear function of current abnormal earnings.(10) The ratios used in this model are liquidity, profitability, and leverage based on a sample of 105 companies that went bankrupt and 2058 for non-bankrupt companies. The logit model is a further development of the linear probability model, using the logit model to estimate the probability of a phenomenon. by reducing the weaknesses that exist in linear probabilities. Here is the Ohlson model:(11)

O = -1.32 – 0.407X1 + 6.03X2 – 1.43X3 + 0.0757X4 – 2.37X5 – 1.83X6 + 0.285X7 – 1.72X8 – 0.521X9

Information:

X1 is SIZEit	= log (total assets/price level index of Gross National Product) in company i year t
X2 is TLTAit	= Total debt divided by total assets in company i year t
X3 is WCTAit	= working capital divided by total assets in company i year t
X4 is CLCAit	= current liabilities divided by current assets in company i year t
X5 is OENEGit	= dummy variable, 1 if total debt is greater than total assets
X6 is NITAit	= net income divided by total assets in company i year t
X7 is FUTLit	= operating cash flow divided by total debt in company i year t
X8 is INTWO	= dummy variable, 1 if net income is negative for two (2) years last and vice versa
X9 is CHINit	= net income in year t-1)/ the absolute value of net income in year t plus the absolute value of net income in year t-1

Grover Model Models

The Grover model is a model created by designing and reassessing the Altman Z-Score model.(8)Jeffrey S. Grover used a similar sample to Altman (1968), with an additional thirteen financial ratios. Grover used 70 companies as a sample, including 35 companies in good health and the same number for companies in an unhealthy condition, namely 35 from 1982 to 1996.(8)The equation for measuring the Grover Score variable is as follows:(12)

G-Score = 1.650X_1 + 3.404X_2 + 0.016 ROA+ 0.057

Information:

X_1 = Working Capital / Total Assets
X_2 = Earning Before Interest and Taxes / Total Assets
X_3 = Net Income / Total Assets

Zmijewski models

This model uses ratio analysis that measures the performance, leverage, and liquidity of a company for its prediction model. Zmijewski used a probit analysis that was applied to 40 companies that had gone bankrupt and 800 companies that were still surviving at that time.(13)This model produced by Zmijewski (1984) is a model that develops several models that already exist and are used previously. The ratio model from zmijewski uses the multiple discriminant analysis (MDA) method.(14)The models that have been successfully developed are:(15)

1 2 004X3 X = 4.3−4.5X +5.7X 0

Notation:

X1 = ROA (return on assets)
X2 = Leverage (debt ratio)
X3 = Liquidity (current ratio)

METHODS

This research uses quantitative research, and is comparative or comparative by using descriptive statistics for data analysis techniques. Quantitative Research Methodology is a type of research according to its paradigm. a quantitative approach based on a paradigm that holds that researchers can deliberately make changes to the world around them by conducting various experiments (16). The source of data used in this research is secondary. Secondary data is a way of reading, studying and understanding with the availability of other sources before the research is carried out (17). The data are usually in the form of published financial statements, which contain statements of loss/profit, cash flow and balance sheets from a number of young entrepreneurs who fall into the sample category.

Data collection technique

This research uses the documentation method. This research uses data obtained from a website which is secondary data from Acehnese novice entrepreneurs in the form of a number of annual financial report data from novice entrepreneurs who are the sample and some other data needed to complete the calculation of several variables in the study. The data processing technique uses SPSS Version 23 software in analyzing summary data and figures include proportion, amount (total), average, percentage, and others.

Data analysis

a. Descriptive statistics

This descriptive analysis used in this study aims to obtain the minimum, mean, maximum and standard deviation values for the five methods used in analyzing bankruptcy. The value of the minimum describes the lowest value, the maximum describes the highest value, the value of the mean describes the average value of a number of samples or data. While the standard deviation describes the variation of the data described, the higher the value of the variables used, indicating the data is spreading or moving away from its mean value. Then if the low value of the variable shows data that is increasingly gathering from its mean value. Descriptive statistics are only related to describing or providing information about a data or situation or phenomenon. In descriptive statistics, the function is to explain conditions, symptoms, or problems (18)

b. Normality test

The normality test is whether the empirical data obtained from the field corresponds to a certain theoretical distribution (19). This test is often used to measure data on an interval, ordinal or ratio scale.Based on the empirical experience of several statisticians, the number of data is more than 30 numbers (n>30), it can be assumed that the data is normally distributed. Commonly referred to as a large sample (20).The normal distribution (and other symmetrical distributions, such as the t distribution or the Cauchy distribution) has a skewness of 0 (zero).(20)

c. Paired Sample T-test (Different Test)

Priyatno (2014:175) explains that this test can be regarded as a type of method to test the average difference that is used to be able to find out if there is a difference in the average value of 2 paired data. Tests were carried out on several variables in this study using statistical tests. If the data is normally distributed, the analysis technique is related to the comparison of methods using paired sample t-test to test the predetermined hypothesis. The results described in this stage of testing refer to the number or probability value (Sig. 2-tailed), if the value generated from Sig. 2-tailed is higher than 0.05, meaning that there is no difference in the two sample groups. Then if it generates the value of Sig. 2-tailed which is not more than 0.05, It can be explained that the two sample groups have a significant mean difference. Priyatno explained that the significance level used in this test was 0.05 (5%). (21)

d. Test Level of Accuracy

After knowing the differences between each model, the next step is to calculate the accuracy of each model by using the correct and incorrect estimates from the results of the calculations for each method. The next step is to compare the results of the correct predictions with the number of samples. The results of this calculation can determine the accuracy of each method in analyzing precisely. The calculation of the accuracy level is: Accuracy level = (Number of correct predictions/total sample) x 100%.

RESULTS AND DISCUSSION

Calculations related to the different tests performed on each model are described as follows:

1. Different Test of Altman and Springate Methods

Table 1.
Altman and Springate Difference Test Calculations

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 Altman - Springate	1.16220	.79282	.11443	.93199	1.39241	10.156	47	.000

Source: Results of data processing (2022)

2. Different Test of Altman and Ohlson Methods

Table 2.
Altman and Ohlson Difference Test Calculations

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 Altman - Ohlson	.80449	1.30146	.18785	.42659	1.18240	4.283	47	.000

Source: Results of data processing (2022)

3. Altman and Grover Method Difference Test

Table 3.
Altman and Grover Difference Test Calculations

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 Altman - Grover	1.05391	.74740	.10788	.83689	1.27094	9.769	47	.000

Source: Results of data processing (2022)

4. Different Test of Altman and Zmijewski Methods

Table 4.
Altman and Zmijewski Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Altman - Zmijewski	4.56908	1.92617	.27802	4.00977	5.12838	16.434	47	.000

Source: Results of data processing (2022)

5. Different Test of Springate and Ohlson Methods

Table 5.
Springate and Ohlson Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Springate - Ohlson	-.35771	.64437	.09301	-.54481	-.17060	-3.846	47	.000

Source: Results of data processing (2022)

6. Different Test of Springate and Grover Methods

Table 6.
Springate and Grover Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Springate - Grover	-.10829	.05155	.00744	-.12326	-.09332	-14.552	47	.000

Source: Results of data processing (2022)

7. Different Test of Springate and Zmijewski Methods

Table 7.
Springate and Zmijewski Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Springate - Zmijewski	3.40688	1.61533	.23315	2.93783	3.87592	14.612	47	.000

Source: Results of data processing (2022)

8. Different Test of Springate and Zmijewski Methods

Table 8
Springate and Zmijewski Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Ohlson - Grover	.24942	.67801	.09786	.05255	.44629	2.549	47	.014

Source: Results of data processing (2022)

9. Different Test of Ohlson and Zmijewski Methods

Table 9.
Springate and Zmijewski Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Ohlson - Zmijewski	3.76458	1.56740	.22624	3.30946	4.21971	16.640	47	.000

Source: Results of data processing (2022)

10. Different Test of Grover and Zmijewski Methods

Table 10.
Grover and Zmijewski Difference Test Calculations

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Grover - Zmijewski	3.51516	1.61478	.23307	3.04628	3.98405	15.082	47	.000

Source: Results of data processing (2022)

The results of the above calculations are related to the accuracy of the prediction model shows that there is one method or prediction model which has the highest level of accuracy, namely the Method or Model Grover. The calculation results from the Grover model get the number the level of accuracy is 91.67%.

CONCLUSION

The Grover method is a method that has the highest level of accuracy in predicting the bankruptcy of business actors registered with SMEs registered in 2022 with an accuracy rate of 91.67%.

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