ANALYSIS OF COMPARISON OF BANKRUPTCY PREDICTION ABILITY BETWEEN ALTMAN Z-SCORE ANALYSIS AND ZMIJEWSKI X-SCORE ANALYSIS IN FINANCIAL SERVICES COMPANIES LISTED ON THE INDONESIA STOCK EXCHANGE FOR THE 2017-2021 PERIOD

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Abstract

This study aims to determine the comparative analysis of bankruptcy predictive ability between the Altman z-score and Zmijewski x-score analyses of financial services companies listed on the Indonesia Stock Exchange for the 2017-2021 period. This study uses secondary data in the form of financial statements of each financial service company, where the sample used in this study is 41 financial service companies listed on the Indonesia Stock Exchange. The data analysis method used is the Altman z-score and Zmijewski x-score models with the help of Microsoft Excel 2019 software. The results of the study reveal that (1) from the results of the Altman Z-Score, it is obtained that as many as 19 companies are predicted to experience bankruptcy within five years of the study period, while 6 financial services companies are predicted not to go bankrupt during the five years of the study period. (2) Zmijewski's analysis shows that 3 financial service companies are predicted to go bankrupt during the five-year study period, and 29 financial service companies are predicted not to go bankrupt during the five-year study period. (3) The results of calculating the level of accuracy found that the Altman Z-Score model is the best in predicting the bankruptcy of financial services companies with an accuracy rate of 68.78%, while the Zmijewski model only obtains an accuracy rate of 16.09%.

Keywords: Bankruptcy Prediction Analysis, Altman Z-Score. And Zmijewski X-Score

INTRODUCTION

Bankruptcy is a condition of a company that is no longer able to meet its obligations or debts or the condition from the beginning of the company can operate and then experience failure in managing its business. According to Idris (2019) Bankruptcy is a condition when the company experiences insufficient funds to run its business, where the factors that cause bankruptcy are divided into 2, namely external factors consisting of economic conditions, political circumstances, and natural disasters, as well as internal factors consisting of company performance, company policies, and corporate culture. A company experiencing bankruptcy can be seen from the condition of the financial statements. Financial statements published by the company are one source of information about the company's financial position, performance and changes in the company's financial position which are very useful to support the right decision making, financial data in the financial statements is useful to see the company's financial health condition. As explained by Kasmir (2017), financial statements are reports that show the company's finances at the moment or in a period. Financial statement analysis is carried out to obtain early warnings of signs of bankruptcy. The earlier the signs of bankruptcy, the better for management because management can make improvements. As explained by Prihadi (2019), analysis of financial statements is useful to see a picture of a company's financial condition. Financial statement analysis is used to evaluate a company's financial position and results of operations.

The Altman Z-score method is one of the mathematical formulations to predict bankruptcy with a fairly accurate level of certainty with a percentage of accuracy reaching 95% and is included in the most popular research because it is often used by many researchers in conducting research, where the model has an accuracy of up to 80% even up to 90% with a potential error of 10-15%. Since then the Altman formula has grown in popularity, not only among bankers, but also auditors, academics and even courts in the United States to assess companies that file for

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bankruptcy (www.akuntasipedia.com). The advantage of the altman z-score method itself is to know the value of the company using the bankruptcy forecast method, so that by using the altman z score method the companycan find out the level of its financial health to prevent company bankruptcy. Munawir (2016) explained that if the company's z-score is included in the critical or vulnerable category, the company will quickly take steps to improve its financial health. Then another advantage of the altman z-score method is suitable for analyzing financial statements that go public and companies that do not go public and is very practical because the altman z-score bankruptcy prediction model is classified as a multivariate analysis which means that the variables forming the altman z-score can be taken from the income statement and the statement of financial position that the company has made.

There are several models for predicting corporate bankruptcy that can be used in addition to the altman z-score model, one of which is the zmijewski model. The Zmijewski model also uses financial ratio analysis that measures performance such as leverage and liquidity of a company for its prediction model. Zmijewski (1983) used probit analysis applied to 40 companies that had gone bankrupt and 800 companies that had survived to that point. According to Melissa and Banjarnahor (2020) in the zjimewski model there are 3 financial ratios used and consist of return on assets, leverage, and current ratio. According to Nurcahyanti (2015) the advantages of the Zmijewski method include combining various financial ratios together, providing appropriate coefficients for combining independent variables, and easy to apply.

THEORETICAL REVIEW

Financial statements are basically a medium of information that summarizes all company activities and are usually reported or presented in the form of balance sheets and income statements at certain times or certain times and ultimately used as an information tool in making policies or decisions for users of financial statements in accordance with their respective interests. Munawir (2016) explained that financial statements are two lists compiled by accountants at the end of the period for a company. The two lists are a balance sheet list or financial position list and an income list or profit and loss list. Recently, it has become customary for companies to add a third list, the surplus list or the undistributed profit list. Financial statement analysis is basically to find out and evaluate a company's financial statements to predict the condition of the company's financial performance in the future and aims to provide more consideration for companies with the level of profitability and level of risk. According to Kasmir (2017), financial statement analysis is a thoughtful process in order to help evaluate the financial position of the company's operating results in the present and past with the aim of determining the most likely estimates and predictions regarding the company's condition and performance in the future.

In analyzing financial statements can be done in several ways, namely by determining and measuring the items in a financial statement owned in a certain period or period. Halim and Hanafi (2018) explained that the objectives of analyzing a financial statement for several parties include:

1. For company owners
   Financial statement analysis is very important to assess the performance of employees and management in carrying out work activities. Financial statement analysis can also help company owners to find out how much dividends will be received, as well as how much growth the company has to survive in its industry, so that company owners can find out how the company's financial situation and the owners of the company can take various steps if there are financial problems in the company.
2. For management
   Financial statement analysis is to evaluate company performance, compensation, and career development. Then also as a tool or medium of their accountability in managing the company to the owner.
3. For shareholders
   Financial statement analysis can be used to determine the company's performance capabilities, revenue, investment security, so that investors can assess the company's financial condition. .
4. For creditors

Financial statement analysis is needed to assess the liquidity, solvency and profitability of the company, so as a basis for providing answers whether the company can be given credit loan guarantees or not, and whether the company is able to pay off debts along with interest.

5. For supplier

   Financial statement analysis is needed to see the company's financial condition. So that suppliers can make decisions whether to provide products or goods or services they sell to the company with *non-cash payments.*

6. For employees

   For employees, financial statement analysis aims to determine adequate income, quality of life, job security, and so on.

7. For the government

   For the government, the analysis of a company's financial statements is needed by the government for the basis of determining the amount of tax liability to be paid by the company, as well as a basis for assessing the company's compliance with regulations, as well as a basis for the government to assess whether the company needs assistance or other actions.

   Bankruptcy can be interpreted as the company's inability to pay off debts that have reached its collection period from unhealthy company conditions, financial difficulties can occur if the company is unable to pay off its debts. Financial difficulties are also a fact the company failed to make a profit, bankruptcy can be associated with economic stress and financial stress. Economic pressure or failure occurs when a company loses money or assets and is unable to cover its costs, while financial failure is reflected in insufficient funds to meet the company's financial obligations (Rudianto, 2018).

IMPLEMENTATION METHOD TYPES OF RESEARCH

This research was conducted on financial services companies listed on the Indonesia Stock Exchange for the 2017-2021 period which was accessed through a *website* with research objects related to the *altman z-score* and *zmijewski x-score* models to predict the potential for future bankruptcy in financial services companies listed on the Indonesia Stock Exchange. The population used in this study is all financial services companies listed on the Indonesia Stock Exchange until 2022, which is 95 companies. Based on the results of sample selection using *purposive sampling* , it shows that the samples obtained are as many as 41 financial services companies listed on the Indonesia Stock Exchange for the 2017-2021 period. Where the total observations obtained for 5 years are as many as 205 observations.

RESEARCH FINDINGS AND DISCUSSION

Altman Z-Score Model Calculation

Altman z-score itself uses five financial ratios that can be combined to determine the difference between companies that are bankrupt or healthy. The five financial ratios consist of working capital to total assets, retained earning to total assets, earning before interest and taxes to total assets, *book value total assets, and sales to total assets*. After obtaining the value of working capital to total assets, retained earning to total assets, earning before interest and taxes to total assets, book value of *equity to book value of total debt, and sales to total assets* . Then we will then conduct an assessment using *the altman z-score* model with the following decision-making basis (Sari, 2018):

1. If the altman z-score obtained is less than 1.23, then the company concerned is predicted to go bankrupt.
2. If the altman z-score is greater than 1.23 and smaller than 2.9, it can be concluded that the company in question is predicted to go bankrupt.
3. If the altman z-score is greater than 2.9, it can be concluded that the company in question is not predicted to go bankrupt.

The altman z-score model formula used is as follows (Sari, 2018):

$$Z = 0.7171X1 + 0.847X2 + 3.107X3 + 0.420X4 + 0.988X5$$

Information:

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X1: Working Capital to Total Assets
X2: Retained Earning to Total Assets
X3: Earning Before Interest and Taxes to Total Assets
X4: Book Value of Equity to Book Value of Total Debt
X5: Sales to Total Asset

Based on the calculation results of bankruptcy prediction analysis using the altman z-score model, it can be seen that a number of companies that are predicted to experience bankruptcy, including:

1. Companies that are predicted to go bankrupt for five years, from 2017 to 2021, are: PT. Asuransi Multi Artha Guna, PT. Asuransi Bintang, PT. Asuransi Dayin Mitra, PT. Asuransi Jasa Tania. PT. Asuransi Ramayana, PT. Buana Finance, PT. MNC Kapital Indonesia, PT. BFI Finance, PT. Equity Development Investment, PT. Radana Bhaskara Finance, PT. Intan Baru Prana, PT. Indomobil Multi Jasa, PT. Lippo General Insurance, PT. Maskapai Reasuransi Indonesia, PT. Sinarmas Multiartha, PT. Trimegah Sekuritas Indonesia, PT. Victoria Investama, PT. Wahana Ottomitra Multiartha, PT. Malacca Trust Wuwungan.
2. Companies that are predicted to go bankrupt for four years: PT. Asuransi Harta Aman Pratama, PT. Asuransi Maximus Graha Persada, PT. Batavia Prosperindo Internasional, PT. Capital Financial Indonesia, PT. Clipan Finance Indonesia, PT. KDB Tifa Finance, PT. Mizuho Leasing Indonesia, and PT. Asuransi Jiwa Syariah Jasa Mitra Abadi.
3. Companies that are predicted to go bankrupt for Three years: PT. Asuransi Bina Dana Artha, PT. Adira Dinamika Multi Finance, and PT. Batavia Prosperindo Finance.
4. Companies that are predicted to go bankrupt for Two years: PT. Panin Sekuritas.
5. Companies that are predicted to go bankrupt for one years: PT. Reliance Sekuritas Indonesia.

Based on the results of bankruptcy prediction analysis using the altman z-score model that obtained gray areas, including:

1. Companies that are predicted to experience gray areas during the five-year research period are PT. Mandala Multifinance
2. Companies that are predicted to experience *gray areas* during the 4-year research period include: PT. Reliance Sekuritas Indonesia and PT. Victoria Insurance.
3. Companies that are predicted to experience *gray areas* during the 3-year research period include: PT. Panin Sekuritas.
4. Companies that are predicted to experience *gray areas* during the 2-year research period include: PT. Asuransi Bina Dana Artha and PT. Batavia Prosperindo Finance.
5. Companies that are predicted to experience *gray areas* during the 1-year research period include: PT. Asuransi Harta Aman Pratama, PT. Asuransi Maximus Graha Persada, PT. Asuransi Jiwa Syariah Jasa Mitra Abadi, PT. Capital Financial Indonesia, PT. Minna Padi Investama Sekuritas, PT. Clipan Financial Indonesia, PT. KDB Tifa Finance, and PT. Mizuho Leasing Indonesia.

Based on the results of bankruptcy prediction analysis using the altman z-score model , it was obtained that the companies that were predicted not to go bankrupt were as follows:

1. Companies that are predicted not to go bankrupt during the 5-year study period consist of: PT. Danasupra Erapacific, PT. Lenox Pasifik Investama, PT. Panininvest, PT. Panin Financial, PT. Trust Finance Indonesia, and PT. Yulie Sekuritas Indonesia.
2. Companies that are predicted not to go bankrupt during the 4-year research period are PT. Minna Padi Investama Sekuritas, namely from 2017 to 2019 and in 2021.
3. Companies that are predicted not to go bankrupt during the one-year research period are PT. Batavia Prosperindo International in 2017.

Based on the results of the research above, it can be seen that there are 19 companies that are predicted to go bankrupt during the 2017-2021 period. Then there are 6 companies that are predicted not to go bankrupt during the 2017-2021 period.

Zmijewski X-Score Model Calculation

In *Zmijewski's* own model uses ratio analysis that measures the performance of the company such as using *leverage* ratios and liquidity ratios for its prediction model. In the *zmijewski* model itself there are 3 financial ratios used return *on assets*, *leverage,* and *current ratio*. After obtaining the value of *return on assets, leverage,* and *current ratio*. Then we will then conduct an assessment using the *zmijewski* model with the following decision-making basis (Sari, 2018):

1. If the *zmijewski* value obtained is greater than 0, then it can be concluded that the company in question is predicted to go bankrupt

2. If the *zmijewski* value obtained is less than 0, then it can be concluded that the company in question is not predicted to go bankrupt.

The formula for calculating bankruptcy prediction analysis using the zmijewski model is as follows (Sari, 2018):

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

Information:
X1 : Return On Assets
X2 : Leverage
X3 : Current Ratio

Based on the calculation of bankruptcy prediction analysis using the *zmijewski x-score* model, it can be seen that a number of companies that are predicted to go bankrupt are as follows:

1. Companies that are predicted to go bankrupt for five years, from 2017 to 2021, are: PT. Intan Baru Prana, PT. Indomobil Multi Jasa, and PT. Victoria Investama.
2. Companies that are predicted to go bankrupt for four years: PT. Wahana Ottomitra Multiartha.
3. Companies that are predicted to go bankrupt for Three years: PT. Asuransi Harta Aman Pratama.
4. Companies that are predicted to go bankrupt for Two years: PT. Radana Bhaskara Finance, PT. KDB Tifa Finance, PT. Sinarmas Multiartha, and PT. Mizuho Leasing Indonesia.
5. Companies that are predicted to go bankrupt for one years: PT. Adira Dinamika Multi Finance and PT. Buana Finance.

Based on the results of bankruptcy prediction analysis using the zmijewski x-score model, it was obtained that the companies that were predicted not to go bankrupt during the study period were as follows:

1. Companies that are predicted not to go bankrupt during the 5-year study period consist of: PT. Asuransi Bina Dana Arta, PT. Asuransi Multi Artha Guna, PT. Asuransi Bintang, PT. Asuransi Dayin Mitra, PT. Asuransi Maximus Graha Persada, PT. Asuransi Ramayana, PT. MNC Kapital Indonesia, PT. BFI Finance Indonesia, PT. Batavia Prosperindo Finance, PT. Batavia Prosperindo Internasional, PT. Capital Finance Indonesia, PT. Clipan Finance Indonesia, PT. Danasupra Erapasific, PT. Equity Development Investment, PT. Lippo General Insurance.
2. Companies that are predicted not to go bankrupt during the 4-year research period are PT. Adira Dinamika Multi Finance, PT. Trimegah Sekuritas Indonesia, and PT. Buana Finance.
3. Companies that are predicted not to go bankrupt during the 3-year research period are PT. Radana Bhaskara Finance, PT. KDB Tifa Finance, PT. Sinarmas Multiartha, and PT. Mizuho Leasing Indonesia.
4. Companies that are predicted not to go bankrupt during the 2-year research period are PT. Asuransi Harta Aman Pratama.

Based on the results of the research above, it can be seen that there are 3 companies that are predicted to go bankrupt during the 2017-2021 period. Then there are 29 companies that are predicted not to go bankrupt during the 2017-2021 research period using the zmijewski x-score model.

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Accuracy Rate

Comparison between predictions and sample categories is carried out on all available samples. After all samples have been calculated, a recap of the company's true and incorrect bankruptcy predictions is obtained, where the number of correct predictions is the result of calculations from each bankruptcy prediction model used (Sembiring, 2016). Based on the results of the calculation of bankruptcy prediction accuracy using *the altman* z-score and *zmijewski z-score* models. So the results were obtained that the bankruptcy prediction analysis using *the altman z-score* had an accuracy rate of 68.78% while the bankruptcy prediction analysis using the *zmijewski x-score* model obtained an accuracy rate of 16.09%. Therefore, it can be concluded that the *altman z-score* model is the best model in predicting bankruptcy of financial services companies listed on the Indonesia Stock Exchange because it has an accuracy of 68.78%. The reason for using percentages in the results of the accuracy level above is to make it easier for researchers to find out what percentage of the truth rate of bankruptcy prediction results by using the *Altman Z-Score* and *Zmijewski X-Score* models, so that the author is easier to conclude which model has the highest level of bankruptcy prediction accuracy.

CONCLUSION

Based on the results of research that has been conducted on the comparative analysis of bankruptcy prediction ability between altman z-score and zmijewski analysis in financial services companies listed on the Indonesia Stock Exchange for the 2017-2021 period, the conclusions in this study are as follows:

a. Based on the results of testing using the altman z-score model, it was found that there were 19 financial services companies that were predicted to go bankrupt during the five-year research period. Then there are 8 financial services companies that are predicted to experience bankruptcy during the 4-year research period, then there are 3 companies that are predicted to experience bankruptcy during the 3-year research period. Furthermore, there is 1 financial services company each that is predicted to experience bankruptcy for 1 year and 2 years of the research period, namely PT. Reliance Sekuritas Indonesia in 2017 and PT. Panin Sekuritas in 2017 and 2020.

b. Based on the test results using the *zmijewski x-score* model, it was found that there were 3 financial services companies that were predicted to go bankrupt during the five-year research period. Then there is 1 financial services company each that is predicted to go bankrupt for 4 years and 3 years of the research period. Furthermore, there are 3 financial services companies that are predicted to experience bankruptcy during the 2-year research period, and 2 financial services companies that are predicted to go bankrupt during the one-year research period. Meanwhile, companies that are predicted not to go bankrupt during the five-year study period are as many as 29 financial services companies.

c. The results of the calculation of the level of accuracy obtained the results that the *altman z-score* model is the best model in predicting bankruptcy of financial services companies with an accuracy rate of 68.78%. While the *zmijewski x-score* model only obtained an accuracy rate of 16.09%.

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