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Bankruptcy Prediction for Oil and Gas Companies in Indonesia Using Z-Score Method

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ABSTRACT
Global oil price condition for these past few years has been fluctuating and has reached the lowest level. This condition will affect oil and gas companies' financial health. This thesis aims to predict the bankruptcy probability of Indonesia's oil and gas companies from 2011 to 2017. The observed companies are oil and gas companies that are listed on IDX. Another aim of this thesis is to observe whether the decline in oil price would influence the company's Z-Score result or not and observe which variable affects the bankruptcy of oil and gas companies. This research uses financial data obtained from the IDX website and the company's website. The result of the research figures out that the Z-Score model could predict at least five companies will face bankruptcy from 2014 to 2017. In 2011, only two companies that are predicted will be bankrupt. In 2012, only one company will be bankrupt, and in 2013 three companies are predicted to be bankrupt. This research also figures out that the decrease in oil price affects the result of Z- Score for E&P companies as E&P companies revenue relies on oil price in the market. For service companies, the decrease in oil price does not directly impact APEX and BIPI, which their line business is providing services for drilling explorations. Companies with low Z-Score are likely to have negative EBIT, low current assets, and high company debt.

Keywords: *Bankruptcy Prediction, Z-Score, Oil Price.*

1. INTRODUCTION

The world's economy is still experiencing pressure since the 2008 crisis in the United States and Europe and is now followed by the economic crisis in China since 2014. A trade war between the US and China affects the economy of developing countries, including Indonesia. One of the global economic impacts is that the world's low oil prices reached the lowest level since 1990. The oil and gas industry has been fluctuating over the past few years. In the second quarter of 2014, world oil prices were still high at USD 100 per barrel. However, world oil prices have fluctuated and tend to decline in recent years. It was noted that throughout 2015 world oil prices were very volatile and spared below USD 40 per barrel when entering the fourth quarter of 2015 [1].

This issue will be a serious obstacle for the oil and gas industry. As time goes by, the world's oil price stabilizes and reaches USD 70 / barrel. The decline in the world's oil prices affects oil-producing countries and influences emerging countries in Southeast Asia. There are several types of oil prices that are used as benchmarks in determining the direction of world oil prices, such as West Texas Intermediate (WTI) and Brent Crude Oil. In Indonesia, Brent Crude Oil is used as the price reference, and also it is used as a benchmark in European and African countries. Whereas WTI is more widely used in countries in America [2].

Since the oil and gas industry has been slowing down, many tender projects for upstream oil and gas have been postponed, and many oil & gas companies must think of ways to survive in the sector. For example, one of the companies engaged in the oil and gas sector, PT Ratu Prabu Energy (ARTI), has difficulty with oil price fluctuations because its main business relies on the oil and gas sector. From the investor perspective, the oil and gas business is considered to be less profitable and even tends to cause losses. This affects the decision-making of investors in invest their money in the right company. Aside from the investor side, the creditor (as one of the funding sources) will assume that the oil and gas business is less profitable and potentially creates the probability of default. The creditor, before lending the funds, must consider the conditions and business of their debtor

candidate. Thus, predictions and analyses of financial statements to assess a company's health are very important for all participants, including the company itself and stakeholders such as investors, creditors, regulators, and the government [3].

Assessing a company's financial health is required to predict whether a company has the potential for bankruptcy or not. One of the tools that can be a reference in predicting bankruptcy is financial statements. Previous research used the Multiple Discriminant Analysis (MDA) method to predict bankruptcy. Reference [4] used the MDA method in a sample of 66 companies classified as successful and bankrupt. The model developed by Altman has an accuracy of 95% in predicting bankruptcy of the total samples tested with predictions one year before bankruptcy. After 45 years, the model was found, the accuracy of the Altman Z- Score model was fairly stable when applied to the current conditions [5].

Several studies have been conducted to predict the bankruptcy of a company. For example, [6] conducted a study of bankruptcy predictions on property industry companies using the Altman Z-Score and Springate methods. Reference [7] analyzed bankruptcy in the PT Indofood company using the Z-Score, Springate, and Zmijewski methods. Reference [8] predicted the bankruptcy of manufacturing companies listed on the IDX using the Altman Z-Score, Springate, and Zmijewski methods. Reference [9] analyzed the effect of oil prices on the bankruptcy of oil companies in Indonesia, Australia, and Singapore. Reference [10] analyzed the prediction of bankruptcy of retail companies in India using the Z-Score method. Reference [11] found that Z-Score produced more accurate results in manufacturing companies compared to companies in other industries. Research on the validity of the Z-Score method conducted by [12] states that Z-Score is more effective for large-scale & commercial banks. Through his research, [13] found that the use of the Altman Z-Score method has accuracy in predicting the financial difficulties of a company and its relation to predictions on the stock market in India.

Some researchers have been using Altman Z-Score so that this research will examine the prediction of bankruptcy of oil and gas companies in Indonesia using the Z- Score method. The Z-Score method's selection in predicting bankruptcy is because the Z-Score model is most widely used in research on bankruptcy predictions compared to other methods. The Altman Z-Score model uses a combination of several financial ratios to become a prediction model with statistical techniques, namely discriminant analysis (MDA) which can be used to predict corporate bankruptcy. From his research, Altman uses financial ratios such as Net Working Capital / Total Assets, EBIT / Total Assets, Retained Earnings / Total Assets, Market Value / Total Debt, and Sales / Total Assets. These ratios will be combined according to the weight determined by Altman. Then, it will be summed so that the calculation results will produce a value with a particular range. The Z-Score value will categorize its financial position in a healthy, vulnerable, or bankrupt condition in the next two years.

1.1 Financial Distress

Financial distress is a condition where a company cannot fulfill its payment obligations, or cash flow proxies indicate that the company will experience difficulties when paying obligations [14]. The probability of default can be defined as the possibility of a company experiencing financial difficulties, causing the company to be unable to carry out its obligations under the agreed time [15]. Financial distress can also be seen as intermediation between solvency and insolvency in a company [16] and is considered to have complex implications for the parties concerned with companies that are experiencing financial difficulties [17]. Companies experiencing financial difficulties can be said to be inefficient producers, and it is probable that the company has much debt but does not have enough cash in its account [18].

1.2 Z-Score Method

The Z-Score method is developed by a business professor from New York University, Edward I. Altman, in 1968. Altman used several discriminant analyzes (MDA) in a sample of 66 public manufacturing companies to test the model. He matched 33 bankrupt companies (Group 1) with 33 healthy companies (Group 2) in terms of industry and asset size. Altman then classifies 22 potential variables into five standard ratio categories: liquidity, leverage, profitability, solvability, and activity ratio. According to the popularity of the ratio in the literature and the potential relevance of this study, he chose five ratios that best represented corporate bankruptcy predictions. Unlike univariate analysis, MDA allows Altman to develop linear variable combinations to distinguish between the two groups. After evaluating five variables with statistical significance, variable correlation, and predictive accuracy, Altman determined the original Z-score function for public manufacturing companies as [4] can be seen in (1).

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 1.0X5 \quad (1)$$

Where:

X1= Working capital/Total assets

X2= Retained earnings/Total assets

X3= Earnings before interest and taxes/total assets

X4= Market value of equity/Book value of total liabilities

X5= Sales/Total assets

Z= Overall index

Altman's model categorized companies into three groups based on the results of Z-Score:

Z-Score ≧ 2.99: healthy company group.

Z-Score between 1.81 and 2.99: a gray area.

Z-Score 81 1.81: the group of companies goes bankrupt.

Altman then makes another formula for emerging market models and non-manufacturing companies. In 1993, Altman succeeded in formulating a development model from the previous model, namely the Z-Score model for non-manufacturing companies and emerging markets [19] that can be seen in (2) and (3).

$$Z'' = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4 \quad (2)$$

$$Z'' = 3.25 + 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4 \quad (3)$$

The Z model "-Score eliminates the Sales/Total assets variable from the previous formula. The aim is to minimize the industry's effect where industry-sensitive variables such as asset turnover are included [20]. Market value of equity/Book value of total liabilities replaces book values with market values on the Z--Score model. This revised Z-core model produces changes to the discriminant zone compared to the previous method.

- Z "> 2.6 Safe Zone
- 1.1 <Z '<2.6 Gray Zone
- Z " <1.1 Distress Zone

2. METHODS

The objects to be observed in this paper are companies engaged in the oil and gas sector and already listed on the Indonesia Stock Exchange from 2011 to 2017. There are nine oil and gas companies that have been listed on the Indonesia Stock Exchange and are sampled in this research, such as ARTI, BIPI, ELSA, ENRG, ESSA, MEDC, RUIS, APEX, BIPI, and PKPK.

This study will focus on predicting the bankruptcy of oil and gas companies. The approach taken includes a quantitative approach (calculation with the Z-Score method) and a qualitative (in-depth interviews and interpretation of results). The Altman Z-Score method's selection is because the authors have not found previous research that focuses on predicting bankruptcy in oil and gas companies with the Z-Score method. In addition, the Z-Score method is proved to apply to the present current condition since it was first developed in 1965.

3. RESULTS AND DISCUSSION

Based on Table 1, during the period 2011 - 2017, there was a fluctuation of the value of Z-Score in each company. From 2011 to 2014, the number of companies that went bankrupt only reached a maximum of four in 2014. Companies that increased bankruptcy in 2014 were SUGI, ENRG, BIPI, and APEX. SUGI and ENRG, which are oil and gas production companies, have a low Z-Score due to low current assets and low EBIT companies. The low assets are due to the decrease in cash assets and excess cash, which also comes from the company's low income. A low EBIT value is indicated because the company has high costs and low income.

Table 1. Z-Score Result

Emiten	Z-Score Average Result						
	2011	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
Elnusa	1.678	2.415	3.191	3.658	3.39	4.05	3.66
Medco	2.536	2.956	2.306	1.515	0.828	1.516	1.799
Radiant Utama	0.9728	1.9649	1.5799	1.1064	0.835	1.029	1.313
Ratu Prabu Energy	1.5291	1.9195	3.0362	2.2736	4.001	3.507	3.927
Sugih	9.809	2.919	0.893	0.585	-0.438	-2.302	-1.674
Eka Surya Prakasa	1.831	5.418	6.997	4.830	2.617	1.509	0.305
Energi Mega Persada	-0.144	0.259	1.265	0.453	-4.893	-7.639	-4.600
Apexindo	2.765	4.854	0.647	0.402	-1.625	0.845	-4.049
Benakat Integra	5.092	6.188	0.443	0.663	-0.594	-2.698	-1.063

Source: Author's work

From the results of the Z-Score calculation in 2015, six companies are categorized as bankrupt. Among them are MEDC, RUIS, SUGI, ENRG, APEX, and BIPI. Four bankrupt companies were the same company in 2014, while two other MEDC and RUIS companies indicated bankruptcy in 2015. MEDC, an oil & gas producing company, was affected in 2015, seen from negative EBIT MEDC and an increase in company debt, which impacts increasing total liabilities. Based on the 2015 annual report, MEDC recorded a decrease in 14.25% profit, and the company's operating expenses increased by 3%, followed by an increase in funding expenses of 7.60%. In comparison, RUIS experienced a decrease in current assets of 20.10%, which came from a decrease in the company's receivables to third parties, which was in line with the decrease in company revenues. The decrease in receivables was also due to the improvement in the receivable turnover day. The company's revenues from the business segments supporting the operations, agency services, and offshore activities also decreased by 12.74%, 9.55%, and 10.33%, respectively.

The number of companies categorized as bankrupt in 2016 declined to 5 companies, while 2 companies entered the gray area category and 2 companies entered the healthy category. MEDC, which was previously bankrupt, began to improve and was in the gray category.

This can be seen from the EBIT value that starts positively. Operating income in 2016 increased by 25.45%. The average realization of crude oil prices in 2016 amounted to USSD 42.29 / barrel or 14.29% lower than in 2015. RUIS was still categorized as bankrupt due to negative post Working capital/Total assets and EBIT value which tended to decrease. Likewise, SUGI and BIPI have negative Working capital/Total assets and EBIT posts. In contrast, APEX is bankrupted due to the low EBIT to the total asset value. The comparison between total equity and low total liabilities also results in a low Z-Score score.

Based on the results of Z-Score calculations in 2017, five companies are categorized as bankrupt, two categories of gray areas, and two healthy categories. For five bankrupt companies consisting of SUGI, ESSA, ENRG, APEX, and BIPI. In 2017, ESSA was categorized as bankrupt with a Z-Score of0.305. ESSA has a negative value of Working capital/Total assets due to lower current assets compared to current liabilities.

From 2011 to 2017, the Altman Z- Score calculation indicated that at least two to three companies were in good health. The number of observations shows that 20 observations fall into the category of healthy companies with a total of 63 observations. Companies that are consistently in healthy condition are Elnusa, Ratu Prabu Energy, and Surya Eka Perkasa. The three healthy companies have oil and gas service business lines. One of the supporters of Elnusa can remain in a healthy condition because Elnusa is a subsidiary of Pertamina. Ratu Prabu Energy still has a source of income derived from renting drilling rigs. Surya Eka Perkasa has business lines in oil & gas refineries, big trade, petrochemicals, and oil and gas exploration services. Surya Eka Perkasa's business is more diversified, so it has a smaller risk of bankruptcy than other companies.

The Altman Z-Score Emerging Market model successfully predicted that four companies experienced bankruptcy from 2011 to 2017. Based on the total number of observations of 63, there were at least 26 observations that were in a state of bankruptcy. However, companies that are indicated to be bankrupt are not the same every year. Examples such as RUIS are only bankrupt in 2011, 2015, and 2016. Likewise, MEDC was only in bankruptcy in 2015 and ESSA in 2017. Simultaneously, companies that are consistently in bankruptcy are SUGI, ENRG, APEX, and BIPI. The company is in a state of bankruptcy for at least five years of observation.

4. CONCLUSIONS

4.1 Conclusions

- Based on the analysis results to 2017, the Altman Z-Score Emerging Market model can predict at least five companies in the distress category. Four companies are in the distress category, namely ENRG, SUGI, APEX, and BIPI. These companies are in the distress category for four years in a row, starting from 2014. Another distress category care MEDC and RUIS in 2015, RUIS in 2016, and ESSA in 2017.
- Companies engaged in the oil and gas industry are differentiated into two types of business lines, Exploration and Production (E&P) companies and service companies. For E & P companies, there are three companies analyzed in this research, namely MEDC, ENRG, and SUGI. While the rest of the companies are engaged in oil and gas services, including drilling services, maintenance & workover services, rig rental services, inspection services, refining services, and logistics services. According to Emerging Market Z-Score calculations, two of the three companies engaged in the E & P business tend to experience bankruptcy since 2014, where world oil prices began to fall. This is because E & P company revenues are very dependent on oil prices in the market.

Nevertheless, for MEDC, it was not too affected due to the cost-efficiency that MEDC had successfully done and made it able to reduce the company's costs. Whereas for oil and gas service companies, the decline in world oil prices is not very influential. However, RUIS is on the average gray area from year to year. Only APEX and BIPI are directly affected, with low Z-Score results.

- Companies that are in the area of bankruptcy have negative EBIT, high debt levels, and low current assets. So many variables X1 to X4 are negative. In this case, it is necessary to review the ideal ratio for companies in the oil and gas industry because each company's financial strategies are different depending on the industry. For E & P companies, negative EBIT directly impacts the company on the decline in oil prices and high debt levels due to high costs, but the company's profitability decreases, so E & P companies tend to have high debt. Low current assets result from decreased profitability which affects cash, account receivable, and cash equivalents. For oil and gas service companies, the low service utilization for oil and gas projects also affects profitability and current assets. However, the low utilization of oil and gas service companies does not significantly affect corporate debt usage.

4.2 Recommendation

The results of Z-Score calculations from 2011 to 2017 show that most companies are in distress conditions every year starting from 2014 to 2017. Some

companies are in the gray area, which is the boundary between healthy distress conditions. Companies in the gray area may experience bankruptcy in the near future

because some financial ratios shown in the Z-Score calculation are below. As for some companies that are categorized as healthy, are predicted to be able to survive in the oil and gas industry, the characteristics of a healthy financial ratio include an excellent liquidity ratio, a more significant proportion of equity to total liabilities, and a constant EBIT value each year. Based on the condition of a healthy company, the recommendations for the company's strategy are as follows:

1. Business Diversification

Business diversification so that business risk can be minimized. In this case, companies engaged in oil and gas depend on their income for global conditions such as world oil prices. A large number of world oil stocks and geopolitical factors have caused world oil prices to fall from 2014. For this reason, business diversification needs to be done, both those which are still related to oil and gas and not related to oil and gas. For example, Elnusa has an oil and gas business such as operation & maintenance. As a service provider company, Elnusa's income depends on oil and gas project exploration and drilling activities. Facing the sluggish oil and gas conditions, Elnusa has expanded into maintenance facilities because either there is a new project or not, maintenance of production facilities will still continue. Based on an interview with one of the Ass. Business Development Manager of Elnusa that Elnusa diversifies business both upstream and downstream. Downstream covers business lines in extensive trade. Although the upstream side is sluggish, the downstream continues to run well to support Elnusa's income.

2. Corporate Debt Restructuring

Debt restructuring is needed to reduce interest costs for the company. The average company with a high level of debt tends to be burdened with high-interest costs. Companies such as APEX, SUGI, and BIPI tend to have negative net working capital due to high debt and interest costs. Companies that have low debt ratios such as ELSA and ARTI tend to be in good health. Based on the results of interviews with the Assistant Manager of Business Development ELSA, stated that at this time, ELSA agreed on working capital loans at low-interest rates with the Japanese Bank. With a low-interest rate from the Japanese Bank making the overall capital cost lower. In addition, ELSA also changes the composition of investments from 50% - 50% to 30% equity - 70% investment.

3. Cost Efficiency

Low world oil prices are not offset by lower exploration & production costs. So that many oil and gas companies that experience income losses are characterized by low EBIT and even negative ones. There needs to be a renegotiation with suppliers and third parties that support the company's business activities. MEDC, which has oil and gas field assets spread across Indonesia, tends to have the ease of negotiating costs that arise with third parties, considering MEDC has bargaining power with large production volumes. In addition, large production fields tend to have low barrel costs.

Furthermore, conversely, every field that produces small amounts tends to have a higher barrel cost. For companies wishing to invest in oil and gas projects, it is necessary to evaluate the estimated oil and gas volumes contained in the field. In addition, the oil and gas industry is famous for its high employee salaries. This needs to be adjusted to the company's condition affected by macroeconomics to start reducing costs per employee to be more efficient.

4. Investment in Renewable Energy Indonesia

Investment in Renewable Energy Indonesia has promising renewable energy potential. Currently, the Indonesian government is conducting studies and development on the potential of renewable energy, namely Geothermal. Geothermal is a renewable energy source that is relatively environmentally friendly because it only comes from heat sources that are inside the earth. Indonesia itself is currently ranked third in electricity utilization with Geothermal (International Geothermal Association). However, the obstacle that currently occurs is that geothermal energy has not been subsidized by the government. The products from geothermal are in the form of electricity, where the government still subsidizes the electricity in Indonesia, so the price is low. As a result, the Geothermal business has not been fully profitable due to low selling prices. So the need for a government role to support this industry continues to grow. At present, none of the nine oil and gas companies have penetrated the geothermal world.

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