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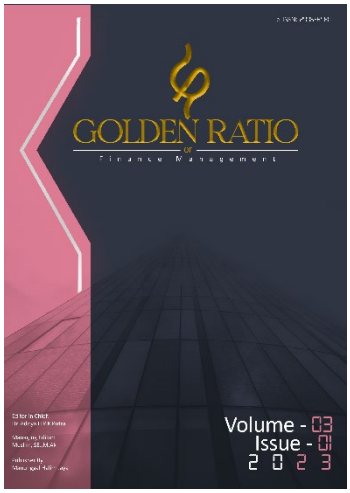

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FINANCE | RESEARCH ARTICLE

Comparison of Financial Distress Predictions With Altman, Springate, Zmijewski, and Grover Models

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Abstract: Several predictive models of financial distress and corporate bankruptcy have been developed. In this study, the Altman model (Z-Score), the Springate model (S-Score), the Zmijewski model (X-Score), and the Grover model (G-Score) were used. These methods are used to analyze the potential for financial difficulties which in the end to determine the potential for bankruptcy at PT Garuda Indonesia (Persero) Tbk. The secondary data used is in the form of financial statements for 2018-2020. The results of the bankruptcy prediction using the Altman model resulted in PT Garuda Indonesia (Persero), Tbk being in the bankrupt area, which experienced financial difficulties in 2018 to 2020. The Springate model was in a distress position and went bankrupt in 2018 and 2020, while in 2019 is in the gray area. Then the Zmijewski model is in a state of bankruptcy, which is experiencing financial difficulties and has the potential to go bankrupt in three years. Grover's model shows the company was in a state of bankruptcy in 2018 and 2020, and safe in 2019.

Keywords: Financial Performance, Potential For Bankruptcy, Financial Statements.

JEL Classification Code: E44, E43, E31

1. INTRODUCTION

In the short term the company aims to maximize current profits, while in the long term it aims to increase the value of the company itself (Setiawati, 2018). If the company's goals do not run smoothly and are not well coordinated, it will have implications for the financial sector. Some companies operating within a certain period of time are forced to fail to fulfill their obligations or be liquidated, due to financial difficulties (Permana, Ahmar, & Djaddang, 2017). Bankruptcy is a problem that can occur in a company if the company cannot maintain the stability of the company's performance. "Bankruptcy is a condition when a company suffers from insufficient funds to run its business"(Yuna Winaya dkk., 2020). The initial process of bankruptcy in a business usually occurs when financial performance decreases or experiences financial difficulties. Some indicators that can be observed by the eksternal party in seeing signs of financial difficulties in the company are a decrease in the amount of dividends that the company distributes to shareholders for several consecutive periods (Martini, Omega, & Faridah, 2020).

Financial failure is a condition of a company that is experiencing financial difficulties, both in terms of funds in the form of cash and in terms of working capital. Companies that experience financial difficulties in the long run have a tendency to go bankrupt. The impact that will be faced when experiencing bankruptcy is the cessation of activities carried out by the company so that the company does not obtain business profits. Insolvency may result in the closure of the company's business or liquidation (Bahri, 2015). Insolvency also has an impact on losses received by the company due to default or claim costs from parties who still receive rights to the company. In order to survive and be able to grow and develop, the company must pay close attention to its condition and performance. To know exactly how the condition and performance of the company is, it is also necessary to have a proper analysis.

Pt. Garuda Indonesia is an Indonesian state-owned airline company that has the concept of Full Service Airlines. In the financial statements of PT. Garuda Indonesia, the company's profit data has

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decreased and even the company suffered losses. The company's total assets have increased every year, in line with the company's debt from 2013 to 2017 has increased. The company's total debt exceeds its total equity, this shows that most of the management activities are financed from debt. The company under no circumstances should the amount of debt be greater than the amount of its own capital or in other words do not let it be greater than 50% so that the guaranteed capital (debt) is not greater than the capital that is its collateral (own capital) (Wangsawinangun, 2014).

Garuda Indonesia is one of the world's largest icons of national airlines and the only state-owned airline that still survives in the air transportation sector to this day, although some time ago pt Garuda Indonesia (Persero) Tbk's shares experienced a decline in support. There were losses in the first and third quarters of 2017 amounting to US$ 99.1 million and US$ 221.9 million or around Rp. 3 trillion (Embu, 2018). The intense competition in the aviation world has resulted in the closure of several other private airlines that are unable to compete and experience poor financial performance. During 2018, PT Garuda Indonesia had a total corporate debt of USD 3.46 billion, an increase from the total debt in 2017 of USD 2.83 billion. PT Garuda Indonesia paid off the avtur debt to Pertamina with a total debt of IDR 2 trillion (Rahma, 2020). If the income is slightly higher while the huge debt will make it difficult for the company plus the interest expense to be paid.

The reality on the ground of PT. Garuda Indonesia tends to experience a decline in profit every year. Since 2015 PT. Garuda Indonesia (Persero) Tbk earned a net profit in 2015 of Rp 1.06 trillion. Then in 2016 PT. Garuda Indonesia earned a net profit of around Rp 125.9 billion. This revenue decreased by 88% compared to net profit in 2015. Then in 2017 PT. Garuda Indonesia recorded a loss of Rp 2.2 trillion. Then in 2018 PT. Garuda Indonesia again recorded a loss of RP 2.4 trillion. Decrease in net profit of PT. Garuda Indonesia is caused by the increase in the total amount of expenses, these expenses include an increase in fuel costs, extraordinary costs, and legal fines, this is in accordance with what garuda indonesia wrote. In the second financial news, that total expenditure increased by 13% from Rp 49.95 trillion to Rp 57.375 trillion. The biggest increase was fuel costs which rose 25% from Rp 12.4 trillion to Rp 15.5 trillion (Sugianto, 2018). The increase in expenditure was due to an increase in fuel and also an increase in aircraft production, which led to an increase in fuel volume. In addition, in 2017, Garuda Indonesia also had to incur extraordinary costs consisting of tax amnesty payments and legal fines in Australian courts amounting to Rp 1.96 trillion. 2020 was a very difficult year for the business world, especially in Indonesia because of the discovery of a dangerous and easily transmitted new virus called a virus. SARS Cov-2 (Covid-19) (Pratiwi, 2022).

The Covid-19 pandemic has an impact on all sectors of the economy, consumption income from the air transportation sector is very influential with the contraction experienced during the pandemic and the existence of PSBB regulations causing limited people to be able to travel through air transportation (Pratiwi, 2022). It can be seen that the income in the air service sector has decreased by around more than IDR 200 billion. The limited use of air transportation and the closure of various tourist attractions in Indonesia have resulted in foreign and local tourists being unable to carry out tourist visits in Indonesia (Pratiwi, 2022). In addition, Garuda Indonesia has many types of aircraft that make management ineffective in managing them while the aircraft rental prices pegged by the lessor are quite high (Ramalan, 2021). Garuda Indonesia currently has a total of 142 aircraft consisting of: Boeing 777-300ER, Boeing 737-800NG, Airbus A330-200, Airbus A330-300, Airbus A330-900neo and ATR 72-600. As of September 30, 2018, the average age of our fleet is 6.62 years (Garuda Indonesia, 2022). This assumption is based on Garuda's performance which has begun to deteriorate since the passenger rate dropped drastically during the Covid-19 pandemic. Of the 36 lessors who became Garuda's partners, some put up expensive aircraft rental prices and some were involved in previous corruption cases (Ramalan, 2021).

The Central Statistics Agency (BPS) noted that the number of airline passengers fell by 90% in May 2020, the decrease in the number of passengers occurred at all major airports observed, namely Ngurah Rai - Denpasar 94.56%, Juanda - Surabaya 94.48%, Kualanamu - Medan 87.76%, Hasanuddin - Makassar 86.33%, and Soekarno Hatta - Banten 85.60% (Putra, 2020). This event affected the profitability experienced by various airlines, one of which was PT Garuda Indonesia (Persero) Tbk. Reporting from Tempo.co (https://bisnis.tempo.co), the airline PT Garuda Indonesia (Persero) Tbk recorded a loss of up to US $ 1.07 billion or around Rp. 15.2 Trillion (14,227 exchange

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rate per US dollar) (Widyastuti, 2020). The loss was recorded in the financial statements for the third quarter of 2020 which were listed on the Indonesia Stock Exchange (IDX). This is contrary to the recorded financial statements for the third quarter of 2019, at that time PT Garuda Indonesia Tbk recorded a net profit of US$ 122.42 million or around Rp. 1.7 trillion.

One of the parameters for assessing the capabilities of a company is to look at the financial performance of the company. The financial performance of an enterprise can be measured and viewed by analyzing reports. Bankruptcy risk prediction can be done by measuring financial statements and analyzing the company's financial ratios to find out the company's financial position (Sulistyowati, 2015). Financial statement analysis activities are one of the media to get more, better, accurate information, and become material in the decision-making process. Analysis of financial statements is a very important tool for obtaining information relating to the condition of the company and the results achieved in connection with the selection of the company's strategy to be determined. The advantage that a company gets if it knows the factors of bankruptcy early on is that it can anticipate aimed at minimizing what is gained from bankruptcy. Bankruptcy will not come suddenly but through its signs.

This study uses the Altman model (Z-Score) to look at potential bankruptcies that may exist in airline companies. The Altman method is easy to use and can get an approximate accuracy rate of 95% (Tambunan, Dwiatmanto, & Wi Endang N.P, 2019). The Springate (S-Score) model is used to measure and distinguish between healthy businesses in insolvent companies and non-bankrupt companies. The Springate model is a model for predicting the survival of a company by combining several financial ratios by giving different weights between these ratios (Sumendap et al, 2019). The Zmijewski model was first used in research on 40 bankrupt companies and 800 non-bankrupt companies. The accuracy rate of the Zmijewski model for the estimation sample was 99% (Avenhuis, 2013). Meanwhile, Grover's model in the consumer goods industry company states that the Grover model is the best model in predicting Financial Distress. Grover's model can be used by financial managers to evaluate the company's performance. although all four models use almost the same ratios and they are often used to predict financial distress.

Relevant in similar research to the context of the aviation industry in Indonesia (Afandi, 2019; Bilondatu, Dungga, & Selvi, 2019; Fitriyah, 2020). This study is to provide an overview of the application of the Altman model, the Springate model, the Zmijewski model (X-Score) and the Grover model (G-Score) in predicting the level of financial performance or potential bankruptcy of aviation companies in Indonesia. In predicting bankruptcy, these models have different degrees of accuracy based on the measurements usedThis study is to provide an overview of the application of the Altman model, the Springate model, the Zmijewski model (X-Score) and the Grover model (G-Score) in predicting the level of financial performance or potential bankruptcy of aviation companies in Indonesia. In predicting bankruptcy, these models have different degrees of accuracy based on the measurements used (Purnajaya & Merkusiwati, 2014). Prediction of bankruptcy is necessary as an early warning before making an investment decision in an enterprise. This research can also be an input for investors to see whether the company will go bankrupt or not so that they can anticipate the possibility of bankruptcy immediately. The main problem that occurred was that PT Garuda Indonesia (Persero), Tbk. experienced a decrease in profit and loss which was shown in 2018-2020. Here are the details of the problem: (1). There was an increase in fuel prices (avtur) in 2018 and the high price of aircraft leases, which made the company bear a greater operational burden; (2). There was a significant decrease in the company's revenue in 2020 to a loss of IDR 15.2 trillion, this was due to the covid-19 virus pandemic in 2020 which required the government to implement PSBB and the closure of various tourist attractions in Indonesia which resulted in a decrease in the number of aircraft passenger departures up to 2,246 million or equivalent to negative 50.6% compared to the previous year.

The above problems are of concern to investors in making the decision to invest in shares in the airline industry. In addition, it is necessary to conduct research that predicts the bankruptcy of the company in order to prepare and improve performance through a fast and appropriate strategy for business continuity.

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2. Literature Review and Hypothesis Development

Bankruptcy is a condition in which the company can no longer fulfill its obligations or the financial condition is declining. The company can be said to be bankrupt (Hanafi, 2010; Tambunan dkk, 2015) if the company is experiencing minor difficulties (such as liquidity problems) and up to more serious difficulties, namely solvable (debt is greater than assets). Law No. 4 of 1998 defines insolvency or bankruptcy as a state where an institution is declared by a court decision if the debtor has two or more creditors and does not pay at least one debt that has matured and can be collected.

2.1. Model Altman (Z-Score)

Z-Score is a tool used to forecast the bankruptcy rate of an enterprise by calculating the value of several ratios and then entering it in a discriminant equation (Korry, Dewi, & Ningsih, 2019). The Altman model was first introduced by Edward I. Altman in 1968 which was developed to determine the tendency of bankruptcy of a company and can also be used as a measure of the overall financial performance (Sari, 2016). The Z-Score formula for predicting bankruptcy from Altman is a multivariate formula used to measure the financial health of a company (Martini, Rachma Sari, Ardiani, & Gumayu, 2015). Altman modified his model to be applicable to all companies, such as manufacturing, non-manufacturing, and bond issuers. The following is the modified Z-Score equation (Altman, 1995) or the so-called Altman (Z-Score) modification:

$$\text{Z-Score} = 6.56\ X1 + 3.26\ X2 + 6.72\ X3 + 1.05\ X4$$

Info:
X1 =Working Capital/Total Assets
X2 =Retained Earnings/Total Assets
X3 =Earnings Before Interest and Taxes/Total Assets
X4 =Market Value Equity/Book Value of Total Debt

The classification of healthy and insolvent companies is based on the Z-Score value of the Altman Mod model namely:

1. If the value of Z < 1.11 = Zone "distress" (the company experiences financial distress and is at high risk of bankruptcy).
2. If the value of 1.11 < Z < 2.6 = "gray" zone (the company experiences financial distress which must be handled with proper management handling. If it is too late, and improperly handled, the company may experience a bump. So in this area there is a possibility of the company going bankrupt or surviving the financial distress period).
3. If the value of Z > 2.6 = "safe" zone (the company is in a healthy state so it is unlikely that bankruptcy will occur).

2.2. Model Springate (S-Score)

Springate formulated a bankruptcy prediction model in 1978. In its formulation, Springate uses the Multiple Discriminant Analysis (MDA) method. The model can predict bankruptcy with an accuracy rate of 92.5%, with the formulation:

$$\text{S-Score} = 1.03\ X1 + 3.07\ X2 + 0.66\ X3 + 0.4X4$$

Info:
X1 = The ratio of working capital to total assets
X2 = The ratio of profit before interest and tax to total assets
X3 = The ratio of profit before tax to current debt
X4 = Ratio of sales to total assets

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The applicable cutoff value is 0.862 (Rahayu (2017) with assessment criteria if:

1. If the value of S < 0.862 = "distress" zone (the company is bankrupt and has a high risk of bankruptcy).
2. If the value is 0.862 < S < 1.062 = “grey” zone (the company is experiencing bankruptcy which must be handled with the right management. If it is late, and not handled properly, the company can go bankrupt.
3. If the value of S > 1.062 = "safe" zone (the company is in a healthy condition so there is little possibility of bankruptcy).

2.3. Model Zmijewski (X-Score)

Zmijewski uses ratio analysis which measures the company's performance, leverage and liquidity. This model emphasizes the amount of debt as the most influential component of bankruptcy (Rudianto, 2013:264). Zmijewski formulas for various types of companies, namely:

$$\text{X-Score} = -4.3 - 4.5\ X1 + 5.7\ X2 - 0.004\ X3$$

Info :
X1 = Earning after Taxes to Total Assets
X2 = Total Debt to Total Assets
X3 = Current Asset to Current Liabilities

With the assessment criteria, the greater the value of Zm, the greater the possibility or probability of the company going bankrupt (Fanny and Saputra, 2000) in (Peter & Yoseph, 2011). If the calculation using this model produces a positive value, then the company has the potential to go bankrupt. On the other hand, if it produces a negative value, the company does not have the potential to go bankrupt (Rudianto, 2013).

2.4. Model Grover (G-Score)

The Grover model is a model created by designing and reassessing the Altman model. Jeffrey S. Grover used a sample according to the Altman model in 1968, adding thirteen new financial ratios. The sample used is 70 companies with 35 bankrupt companies and 35 companies that are not bankrupt from 1982 to 1996. (Jeffrey S. Grover, 2001) produces the following function:

$$\text{G-Score} = 1.650\ X1 + 3.404\ X2 - 0.016\ X3 + 0.057$$

Info :
X1 = Working capital/Total assets
X2 = Earnings before interest and taxes/Total assets
X3 = Net income/Total assets

Grover's model categorizes companies in bankruptcy with a score less than or equal to -0.02 (Z -0.02). While the value for companies that are categorized as not bankrupt is more or equal to 0.01 (Z 0.01).

3. Research Method and Materials

This research is a quantitative study. At this writing, objective data is needed to facilitate the analysis. The author uses the documentation method, namely by obtaining data and information in the form of books, archives, documents, written numbers and pictures in the form of reports and journals as well as other references that are related and can support. Documents can be in the form of writing, pictures, or monumental works of someone (Sugiyono, 2015). The data used in the form of

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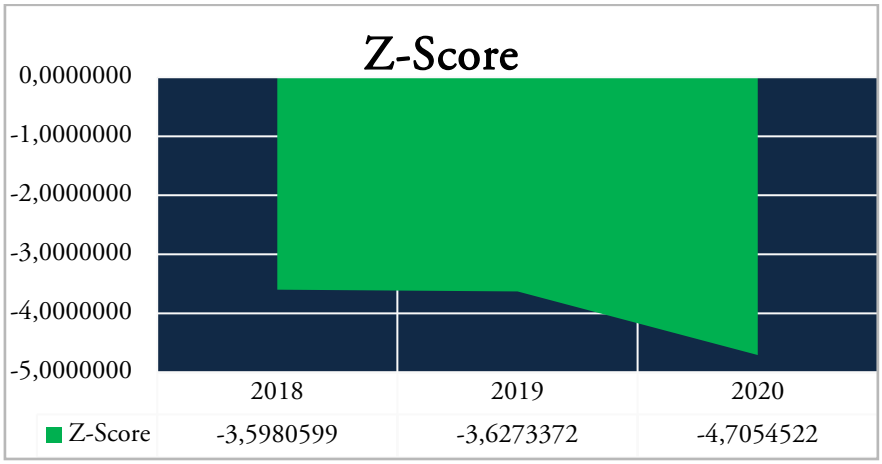
secondary data in the form of a statement of financial position and comprehensive income statement of PT Garuda Indonesia (Persero), Tbk. in the category of airline industry companies listed on the Indonesia Stock Exchange (IDX) for the 2018-2020 period.

4. Results and Discussion

Prediction of potential bankruptcy with the Altman model (Figure 1) indicates that in 2018 to 2020 the company is declared in the "distress" zone. This means that the company is experiencing signs of bankruptcy so that the company is declared in a potentially bankrupt state.



Source: Data processed by the author, (2022)

Figure 1: Altman Model Bankruptcy Prediction (Z-Score)

With the Springate Model, in 2018 the company was declared in the "distress" zone which was indicated by the value of S < 0.862 so that it had a high potential for bankruptcy. This reflects the condition of the company being in a state of financial distress which has a high risk of causing bankruptcy. The main causes of this condition can be seen in the low level of liquidity, the income received continues to decline, as well as the result of working capital that is not proportional to total assets in the last three years. In 2019 the company was declared in the “grey area” zone. This vulnerable condition or gray area reflects that the company is starting to experience financial difficulties that require prompt and appropriate handling so that these problems can be prevented and do not get worse which can lead to bankruptcy. So, in this gray zone, the company can still survive the possibility of bankruptcy, which means the company is experiencing high-risk financial difficulties and can go bankrupt.

In 2020 the company was again in a state of "distress" indicated by the value of S < 0.862. The results of Altman and Springate's calculations and analysis of the four financial ratios conclude that the company is experiencing financial difficulties with a high risk of bankruptcy from 2018 to 2020. This is due to an increase in general and administrative expenses of the company as well as an increase in fuel prices so that PT GIAA bears the cost of goods sold. The effect of the reduced number of flight schedules and sales volume also has an impact on the company's financial performance. If this condition is not handled quickly and appropriately by the company's management, it is possible that the company will experience losses that lead to financial difficulties in the future.

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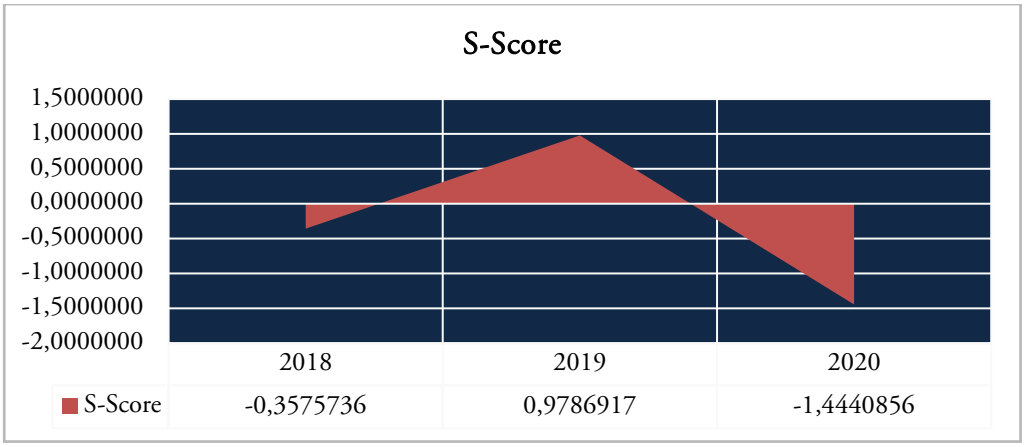
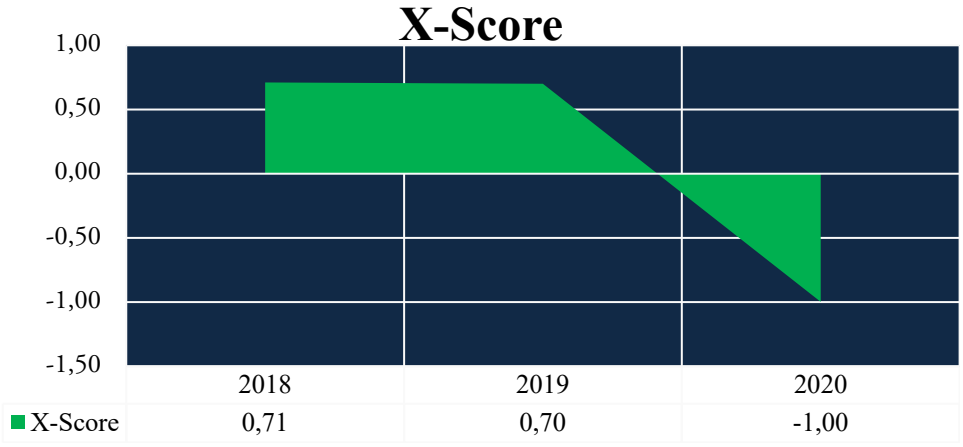


Source: Data processed by the author, (2022)

Figure 2: Springate Model Bankruptcy Prediction (S-Score)

The prediction with the Zmijewski Model is depicted in Figure 3. In 2018 the company was declared to be potentially bankrupt as indicated by the value X > 0. This reflects the condition of being in a state of Financial Distress. The main cause is the condition of low liquidity, the income received continues to decline, as well as the result of working capital that is not proportional to total assets in the last three years. In 2019 the company was again declared in a potentially bankrupt condition indicated by the value X > 0. This is because the amount of operating income continues to decline and is not proportional to its total assets, the company experienced a decrease in operating income, then there was an increase in the number of short-term liabilities to be exact. increase in third party trade payables, accounts payable to related parties, long-term liabilities on finance leases and other liabilities. In 2020 the company has a value of X = -0.01 so that it is classified as not potentially bankrupt as seen from the value of X < 0. This is because the increase in assets is precisely in the increase in fixed assets which makes the Return of Assets increase even though there is a decrease in X2 due to the increase in the company's total liabilities.



Source: Data processed by the author, (2022)

Figure 3: Zmijewski Model Bankruptcy Prediction (X-Score)

Prediction of potential bankruptcy with the Grover model, in 2018 the company was declared in the "distress" zone, reflecting that high-risk conditions lead to bankruptcy. The main causes of this condition can be seen in the low level of liquidity, the income received continues to decline, as well as the result of working capital that is not proportional to total assets in the last three years. In 2019 the company is in the “safe” zone. Characterized by an increase in operating income and an increase in total assets although accompanied by an increase in operating expenses. In 2020 the company is

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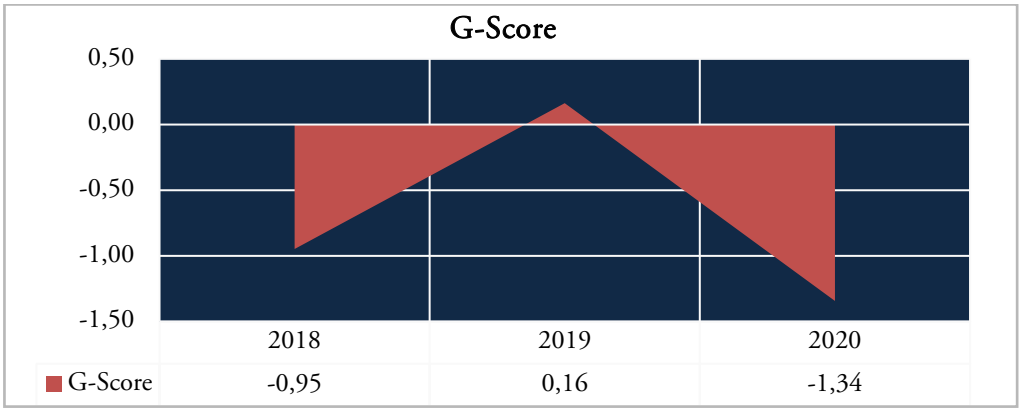
again classified as a company that has the potential to go bankrupt or the "bankrupt" zone. This is due to a decrease in X2. The decrease was caused by an increase in operating expenses, financial expenses and other expenses followed by a decrease in the company's profit and not proportional to its total assets so that it experienced a higher loss than in 2018.



Source: Data processed by the author, (2022)

Figure 4: Grover's Model Bankruptcy Prediction (G-Score)

The overall comparison and calculation (Table 1) can be concluded that the four bankruptcy prediction models provide an overview of companies in the category of experiencing "distress" conditions. It really requires appropriate action in improving financial performance in order to become better and in order to rise from adversity for the sake of survival. This is in line with news about the decline in net profit to PT GIAA's loss and the condition of the domestic aviation industry facing challenges with the Covid-19 pandemic and causing a decline in the interest of airplane passengers.

Table 1: Bankruptcy Prediction Comparison

Category	Percentage Comparison of Four Models			
	Altman	Springate	Zmijewski	Grover
Bankrupt	100%	67%	67%	67%
Safe	0%	0%	33%	33%
Grey Area	0%	33%	0%	0%

Source: Data processed by the author (2022)

The company's ability to compete is largely determined by the company's performance. Companies that are not able to compete to maintain performance will be alienated from their industrial environment and will experience bankruptcy. In order for the survival of a company to be maintained, the management must be able to maintain or even encourage the company to always make improvements and the company is required to have added value in order to compete in the global market, the added value is not only the financial aspect in the form of increased profits, but also non-financial in the form of credibility in the eyes of investors (Martini, et al., 2021; Sari, et al., 2022). Basically, the purpose of establishing a company is to make a profit and maximize the prosperity of the owner of the company. Company management is required to perform optimally in all company activities, especially financial condition issues so as to avoid losses and bankruptcy conditions. Performance improvement needs to be continuously maintained and improved by each company to maintain continuity so that financial conditions remain stable and not problematic. In general, the performance of a company is shown in published financial reports (Coal, 2012).

Investors are interested in investing in companies whose operating profits continue to increase. Increased operating profit, has an impact on retained earnings. The increase in retained earnings and working capital has implications for an increase in total sales. On the other hand, if working capital continues to decline, it will result in a decrease in profits. This phenomenon will lead to financial difficulties, and if it continues can lead to bankruptcy. Good working capital management can

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maintain business liquidity (Martini et al., 2021). To increase earnings, it is necessary to increase sales and income, operational cost efficiency, and accounts receivable must be managed optimally. This anticipation is expected to ensure the availability of working capital.

5. Conclusion

The results of calculations and analysis using the Altman, Springate, Zmijewski and Grover models at PT Garuda Indonesia (Persero) Tbk provide a varied. In 2018, the four models gave the same results, which showed the company was in a "bankrupt" condition, while in 2019 the Altman and Zmijewski models showed "bankrupt" results, while the Springate "grey area" and the Grover model showed "safe" results. Furthermore, in 2020 all three models indicated "bankrupt", except the Zmijewski model which showed "safe". The conclusion from the four models is that the company is in a state of financial difficulty or is prone to bankruptcy. This shows that the increase in fuel prices and aircraft rental prices as well as a decrease in demand for flights have an effect on the results of the company's bankruptcy analysis. Under these conditions, the company bears the cost of goods sold, general and administrative expenses as well as larger operating expenses. This is evidenced by the increase in fuel prices in 2018 and the Covid-19 pandemic in 2020 affecting the performance of the aviation industry in Indonesia.

PT Garuda Indonesia (Persero) Tbk, the company is classified as insolvent, if it refers to the results of the analysis of bankruptcy predictions with the Altman, Springate, Zmijewski and Grover models in. This is because in 2015 to 2020 the company experienced a very significant decline in profits to the point of experiencing losses. The working capital that is owned shows negative results, the profit earned by the company will be small as well. As a result, there will be financial difficulties and if this situation continues, the company will go bankrupt. The company should provide the results of the analysis of bankruptcy predictions in the annual financial statements, so that stakeholders and investors and creditors can clearly know the condition of the company. Efforts that can be made by the company include optimizing revenue and cost efficiency. Management is also expected to make new policies to get out of financial difficulties, because PT Garuda Indonesia as one of the state-owned companies that is the supporter of the country's economy and as a source of income for the country's economy.

The results of the analysis of financial difficulties are not entirely appropriate to measure the prediction of bankruptcy. However, the results of the analysis are still important to be carried out and are considered as early warnings in being aware of the occurrence of corporate bankruptcy. Managers are expected to develop and provide appropriate steps if the company experiences financial difficulties so that there will be no bankruptcy. For further research, it is recommended to increase the number of calculation models used or predictive models so that the calculation results obtained are more accurate and valid, such as using the Fulmer and Ohlson models.

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