

Financial Distress Analysis Using Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score) Models in the Tourism, Hospitality and Restaurant Subsectors Listed on the Indonesia Stock Exchange Period 2015-2019

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Abstract

Financial Distress Analysis is one way to determine the condition of a company. This information is very important for companies and stakeholders in making decisions. The purpose of this study is to calculate the score from the model used, namely Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score) and to test or analyze the level of accuracy of each other in the Tourism, Hospitality and Restaurant subsector listed on the Indonesia Stock Exchange period 2015-2019. This research methodology is descriptive quantitative using secondary data with purposive sampling technique and the analysis method is quantitative analysis using the Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score). The results of this study indicate that the Springate model (S-Score) has the highest level of accuracy in predicting financial distress, which is 68.75% higher than the other three models.

Keywords:

Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), Grover (G-Score), and Financial Distress

1. Introduction

President Joko Widodo asked his staff to move quickly in developing tourist destinations. He said that the tourism sector is considered to be a motor of economic growth and a foreign exchange earner. (Kementrian Sekretariat Negara, 2019). In 2017 the tourism sub-sector became the second largest contributor to foreign exchange in Indonesia after palm oil exports. According to the Central Bureau of Statistics (BPS) and the Ministry of Tourism Republik Indonesia, in 2015 the foreign exchange contributed by the tourism sub-sector was \$ 10.8 billion, with 10.23 million foreign tourists visiting. In 2016, foreign exchange increased to \$ 11.2 billion with a visit rate of 11.52 million. Then in 2017 the foreign exchange provided from this sub-sector became \$ 13.1 billion with an increase in visits of 14.04 million. Then foreign exchange in 2018 increased significantly, namely 25.19% to \$ 16.4 billion with foreign tourist visits of 15.81 million visits. In 2019 tourism again contributed \$ 17.6 billion and visits increased to 16.11. With an increase in foreign exchange and visit rates every year, this sub-sector is predicted to be the largest contributor to foreign exchange in the next five years with the hope that the level of visits can reach 30 million visits (Kemenparekaf, 2019).

Even though the tourism sub-sector is one of the largest foreign exchange contributors with the level of visits that always increases every year, the financial performance of several companies in this sub-sector has a decline in profits and even losses in several years. Based on the financial reports published by 16 companies in this subsector, 8 of them have a negative earnings (loss), 7 other companies have a decreased earnings, and only one company get

earning positive in the last five years. According to (Sormunen and Laitinen, 2012) stated that the process of financial distress also consists of several stages, which are;

- Early stage: In this stage, a decline in profitability in the financial statements is observed.
- Late stage: The decline in profitability is accompanied by a rise in leverage in the financial statements.
- Final stage: The decline in profitability is accompanied by the increase in leverage and the decline in liquidity in the financial statements.

Financial distress is defined by (Hofer, 1980) as a condition in which company had negative net income for several consecutive years. Meanwhile (Hopwood, McKeown and Mutchler, 1984) financial distress occurs when negative working capital, operating losses, and negative retained earnings occur simultaneous. Though these two definitions, financial distress signal can be seen from the financial statement reported by the company.

Analysis of financial statements using ratios is one way to determine the condition of a company at a certain time. Therefore, financial ratio analysis can also be used to predict financial distress. In the book written by (Kristanti, 2019) there are 2 analysis models in predicting financial distress, namely classic models and alternative models which are further divided into 6 ways to analyze financial distress including Univariate Analysis, Multivariate Analysis, Conditional Probability Model, Decision Tree, Artificial Neural Network, and Survival Analysis. In the journal (Edi and Tania, 2018) financial distress tools or models have been developed by previous researchers to determine the level of a company's financial performance. The previous researchers, such as, Fuzzy (1965), Beaver (1966), Altman (1968, 1984, 1995), Springate (1978), Zmijewski (1983), Grover (1968) and many others. With the development of various models carried out by previous researchers, it proves that the prediction of financial distress is very important for companies to determine the company's financial condition.

In the journal (Aminian, Mousazade and Khoshkho, 2016) entitled "Investigate The Ability of Bankruptcy Prediction Models of Altman and Springate and Zmijewski and Grover in Tehran Stock Exchange" the results showed that in the five years of the study to predict the company's bankruptcy, respectively the model of Grover, Altman, Springate, and Zmijewski have the better ability to predict financial crises. It's also supported by research conducted by (Ditasari, Sasongko and Triyono, 2019) with the title "Comparison of Altman, Springate, Zmijewski, and Grover Models in Predicting Financial Distress of Jakarta Islamic Index (JII) on 2013-2017" which shows the results that There is no significant difference between the four models in predicting financial distress. This can be seen from the results of statistical tests which show the sig value of $0.156 > 0.05$.

Information about financial distress is very useful for management and stakeholders of financial statement in creating strategies to avoid bankruptcy. Especially in the tourism subsector, because this sector is believed to be a motor of economic growth as well as a source of foreign exchange according to what President Joko Widodo explained in his command.

The purpose of this study is to calculate the score from the model used, namely Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score) and to test or analyze the level of accuracy of each other in the Tourism, Hospitality and Restaurant subsector listed on the Indonesia Stock Exchange period 2015-2019. Based on the problem and the purpose of this study, researchers interested to do research entitled "Financial Distress Analysis Using Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score) Models in the Tourism, Hospitality and Restaurant Subsectors Listed on the Indonesia Stock Exchange Period 2015-2019"

2. Literature Review

2.1 Financial Distress

Financial distress according to (Brigham and Daves, 2003) is a situation where the company is no longer able to pay the liabilities at maturity. Another situation is when there are indications that the company will not be able to pay the liabilities, which is reflected in the projected cash flows it has. According to (Drescher, 2014) financial distress is the final stage of a liquidity crisis and potentially included in the bankruptcy stage.

The benefits of financial distress information (Platt and Platt, 2002) are to accelerate management actions in preventing problems before bankruptcy such as mergers or takeovers so that the company can pay off debts and manage the company properly, as well as an early warning of bankruptcy in the coming period. Information on

financial distress can also be useful for stakeholders such as investors, creditors, governments, and other parties who are useful in making decisions.

2.2 Altman Z-Score Model

Altman was the first researcher to use the Multiple Discriminant Analysis (MDA) technique in 1968. Research conducted by Altman gave the result a formula known as the Altman Z-Score. This model classifies the possibility of distress, gray area, and health for the company (Altman, 1968).

In the research (Türk and Kurklu, 2017) entitled “Financial Failure Estimate In Bist Companies With Altman (Z-Score) And Springate (S-Score) Models” The results show that the Altman model shows an accuracy rate of 69% compared to the springate model only provides an accuracy rate of 57%.

Altman's model develops over time by expanding the model that can predict all companies, whether go public, non-public, or non-manufacturing. The formula used in this study is the second revised Altman model in 1995. The formula for the revised model is:

$$Z = 6,56 X_1 + 3,267 X_2 + 6,72 X_3 + 1,05 X_4$$

Information:

Z = Overall Index

X₁ = Working Capital / Total Asset

X₂ = Retained Earnings / Total Asset

X₃ = Earning Before Interest and Taxes / Total Asset

X₄ = Book Value of Equity / Book Value of Total Debt

The Z-Score index is the value of all the equation functions above. This model has a cutoff of Z to determine the firm's distress, gray area, or healthy condition. This model categorizes the condition of the company as follows:

- a. If the Z-Score $Z < 1.1$ then the company is distressed.
- b. If the Z-Score is between $1.1 < Z < 2.6$ then the company is in a gray area.
- c. If the Z-Score $Z > 2.6$ then the company is not distress (healthy).

2.3 Springate S-Score Model

Gordon L. V Springate (1978) conducted research using the same method or technique as Altman's Multiple Discriminant Analysis (MDA). This model is known as the Springate model which uses four out of 19 financial ratios in the literature.

In the study (Tahu, 2019) there were eight companies sampled in predicting financial distress. This study shows that the Springate model has an accuracy rate of 62.5% with a type error of 37.5% compared to the Altman model which has an accuracy rate of only 50% with a type error of 50%.

Through the 4 financial ratios formulated by Gordon L. V. Springate, it can predict the condition of a company with two classifications, namely distress and non-distress (healthy). The results of the 4 ratios are summarized in this model with the following formula:

$$S = 1,03A + 3,07B + 0,66C + 0,4D$$

Information:

S = Overall Index

A = Working Capital / Total Asset

B = Earning Before Interest and Taxes / Total Asset

C = Earning Before Taxes / Current Liabilities

D = Sales / Total Asset

Based on the results of the S-Score of all the functional equations above. This model classifies the S-Score to determine the condition of the company as distress and non-distress (healthy). The S-Score cutoff point is categorized as follows:

- a. If S-Score $S < 0.862$ the company is in a state of distress.
- b. If S-Score $S > 0.862$ then the company is not distress (healthy).

2.4 Zmijewski X-Score Model

The prediction model created by Zmijewski in 1983 was a repeating 20-year study. The financial ratios chosen by Zmijewski are ratios that have been done by previous researchers. This model uses ratio analysis that measures the company's performance, leverage, and liquidity (Zmijewski, 1984).

The result of the research entitled *An Analysis of Bankruptcy Likelihood on Coal Mining Listed Firms in the Indonesian Stock Exchange: an Altman, Springate and Zmijewski Approaches*, showed that Zmijewski model is the most accurate predictive models that can be applied to coal mining company listed on the Indonesia Stock Exchange (IDX). This model has the highest level accuracy compared to other predictive model that are equal to 78.95% followed by Springate model and Altman Model. (Salim and Sudiono, 2017).

With the financial ratios formulated by Zmijewski, it can predict the condition of a company with two classifications, namely distress and non-distress (healthy). The ratios made are summarized in this model with the following formula:

$$X = -4,3-4,5X_1 + 5,7X_2-0,004X_3$$

Information:

X = Overall Index

X₁ = Return on Asset (ROA)

X₂ = Leverage (Debt Ratio)

X₃ = Liquidity (Current Ratio)

The cut-off point of this model is 0. If the X-Score value is more than 0 ($X > 0$) then the company is predicted to be in financial distress, but if the X-Score is less than 0 ($X < 0$) then the company is predicted not to experience financial distress (healthy).

2.5 Grover G-Score Model

This model was discovered by Jeffrey S. Grover in 2001. This grover model is a model formed by redesigning and reassessing the Altman Z-Score model (Sari, 2013). Jeffrey S. Grover used the same sample as the Altman Z-Score model and added 13 new financial ratios.

The conclusion from the research conducted by (Verlekar and Kamat, 2019) entitled *Recalibration and Application of Springate, Zmijewski and Grover Bankruptcy Models in Indian Banking Sector* states that the grover model has better performance among other models such as Springate and Zmijewski.

$$G = 1,650X_1 + 3,404X_2-0,016X_3 + 0,057$$

Information:

G = Overall Index

X₁ = Working Capital / Total Asset

X₂ = Earning Before Interest and Taxes / Total Asset

X₃ = Net Income / Total Asset (ROA)

Based on the results of the G score from all the functional equations above. This model classifies the G-Score to determine the condition of the company as distress, gray area and non-distress (healthy). The G-Score cutoff points are categorized as follows:

- If the G-Score $G < -0.02$ then the company is in a state of distress.
- If the G-Score is between $-0.02 < G < 0.01$ then the company is in a gray area.
- If the G-Score $G > 0.01$ then the company is not distress (healthy).

3. Methodology

This research methodology is descriptive quantitative using secondary data with purposive sampling technique and the analysis method is quantitative analysis using the Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score). The object of this research is the financial ratio, unit of analysis used in this study is the organization located at the research location, namely tourism, hospitality, and restaurant subsector listed on the Indonesia Stock Exchange (IDX). Data in this study is financial statement accessed through the website www.idx.co.id

4. Analysis and Discussion

There are 35 companies listed in the tourism, hospitality, and restaurant subsector on the Indonesia Stock Exchange (IDX), but the samples of this study were 16 companies with predetermined criteria. These criteria are:

1. Tourism, hospitality and restaurant subsector companies listed on the Indonesia Stock Exchange (IDX).
2. The reporting currency is Rupiah
3. The reporting period is December 31
4. Companies that report financial statements (audited) on the Indonesia Stock Exchange 2015-2019.

Table 1. Calculation of the Altman Z-Score Model

| Issuer Code | 2015 | 2016 | 2017 | 2018 | 2019 |
|----------------|-------|-------|------|------|-------|
| BAYU | 3.43 | 3.88 | 3.96 | 4.49 | 4.91 |
| BUVA | 1.18 | 1.93 | 0.18 | 0.53 | -0.30 |
| FAST | 3.21 | 4.17 | 4.02 | 4.60 | 4.04 |
| HOTL | -1.21 | 1.09 | 1.11 | 1.29 | -0.04 |
| ICON | 2.39 | 2.80 | 3.37 | 4.78 | 6.78 |
| INPP | 5.00 | 4.95 | 2.10 | 2.32 | 7.36 |
| JHHD | 3.25 | 3.41 | 3.85 | 4.08 | 3.42 |
| JSPT | 5.36 | 4.82 | 4.28 | 4.47 | 3.40 |
| KPIG | 5.63 | 7.65 | 7.31 | 5.33 | 5.75 |
| PANR | 1.10 | 1.55 | 2.48 | 1.86 | 2.02 |
| PDES | 1.83 | 2.47 | 2.49 | 1.91 | 2.27 |
| PJAA | 3.76 | 2.37 | 3.14 | 2.41 | 3.21 |
| PNSE | 3.86 | 3.75 | 3.30 | 2.51 | 2.18 |
| PSKT | -3.10 | -2.30 | 6.95 | 5.76 | 4.84 |
| PTSP | 1.23 | 1.25 | 1.37 | 2.50 | 2.64 |
| SHID | 2.14 | 2.17 | 2.64 | 2.82 | 2.80 |
| <i>Maximum</i> | 5.63 | 7.65 | 7.31 | 5.76 | 7.36 |
| <i>Minimum</i> | -3.10 | -2.30 | 0.18 | 0.53 | -0.30 |

In the tabel 1 calculation of the Altman Z-Score Model has three criteria in describing the company's financial condition, namely healthy condition, gray area condition and distress condition. The company is in a healthy condition, if the z-score result is more than 2.6 ($Z > 2.6$), while the distress company has a z-score below 1.1 ($Z < 1.1$), and if the company has a score between 1.1 and 2.6 ($1.1 < Z < 2.6$) then the company is in a gray area condition. Based on the table presented above, distress conditions are marked in red and gray areas are marked in gray, while healthy companies are marked in white. In 2015 and 2016, there were 8 companies that were categorized as healthy in the tourism sub-sector with the highest score in each year, namely 5.63 and 7.65 which were obtained by KPIG, then there were 6 companies in the gray area, and in distress conditions there are 2 companies with the smallest earnings, namely -3.10 and -2.30 by PSKT issuers. In 2017, the healthy condition in this sub-sector increased to 10 companies with the highest score, namely 7.31, which were still obtained by KPIG issuers, then the gray area condition decreased to 5 companies, and this year the distress condition was only experienced by BUVA with a score of 0.18. Furthermore, in 2018 the condition of companies that were categorized as healthy in the tourism sub-sector were 8 companies with the highest score obtained by issuers coded PSKT, namely 5.76, then there were companies that experienced gray areas, namely 7 companies, and in distress conditions there was 1 company with the most gains small, namely 0.53 by the BUVA issuer. In 2019, companies experiencing healthy conditions increased to 11

companies with the highest score, namely 7.36 by the issuer INPP, while the gray area condition was 3 companies and distress conditions were 2 companies with the lowest score of -0.30 by the issuer BUVA.

Table 2. Calculation of the Springate S-Score Model

| Issuer Code | 2015 | 2016 | 2017 | 2018 | 2019 |
|----------------|-------|-------|-------|-------|-------|
| BAYU | 1.46 | 1.51 | 1.55 | 1.69 | 1.91 |
| BUVA | -0.09 | 0.12 | -0.16 | -0.04 | -0.27 |
| FAST | 1.14 | 1.45 | 1.33 | 1.56 | 1.46 |
| HOTL | -0.21 | 0.17 | 0.18 | 0.15 | -0.04 |
| ICON | 0.46 | 0.58 | 0.69 | 1.06 | 1.36 |
| INPP | 0.39 | 1.26 | 0.18 | 0.27 | 4.81 |
| JHHD | 0.28 | 0.26 | 0.37 | 0.34 | 0.24 |
| JSPT | 0.96 | 0.73 | 0.64 | 1.08 | 0.44 |
| KPIG | 0.55 | 1.93 | 2.06 | 0.78 | 0.28 |
| PANR | 0.73 | 0.62 | 0.66 | 0.55 | 0.51 |
| PDES | 0.54 | 1.12 | 1.18 | 0.62 | 0.36 |
| PJAA | 1.05 | 0.48 | 0.78 | 0.53 | 0.82 |
| PNSE | 0.79 | 0.40 | 0.81 | 0.13 | 0.08 |
| PSKT | -0.82 | -0.47 | -0.78 | -0.30 | -0.13 |
| PTSP | 0.67 | 0.87 | 0.96 | 1.37 | 1.41 |
| SHID | 0.08 | 0.07 | 0.22 | 0.23 | 0.10 |
| <i>Maximum</i> | 1.46 | 1.93 | 2.06 | 1.69 | 4.81 |
| <i>Minimum</i> | -0.82 | -0.47 | -0.78 | -0.30 | -0.27 |

In the Springate S-Score model or table 2, the company will be healthy if it has an S-Score above 0.862 ($S > 0.862$) and it is said to be distressed if the S-Score is less than 0.862 ($S < 0.862$). Based on table 2 through the springate model, the tourism sub-sector is dominated by a distress state. In 2015, there were 4 companies that had a healthy condition with the highest score, namely BAYU at 1.46 and there were 12 companies that were in distress with the lowest score of -0.82, namely PSKT issuers. In 2016, companies with a healthy condition increased to 6 companies with the highest score, namely 1.93 by KPIG issuers and 10 companies experiencing distress with the lowest score were still obtained by PSKT issuers of -0.47. Furthermore, in 2017 there were 5 companies with a healthy condition with the highest score obtained by KPIG issuers, namely 2.06 and PSKT issuers still in a distress condition with the lowest score of -0.78. In 2018, there were 5 companies that experienced a healthy condition with the highest score, namely 1.69 by the issuer BAYU and there were still 11 companies experiencing distress conditions with the lowest score obtained by PSKT, namely -0.30. Then in 2019 the condition of a healthy company, there were 5 companies with the highest gain obtained by INPP issuers of 4.81 and 11 other companies experiencing distress conditions with the lowest BUVA score of -0.27.

Table 3. Calculation of the Zmijewski X-Score Model

| Issuer Code | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------|-------|-------|-------|-------|-------|
| BAYU | -1.94 | -2.03 | -1.83 | -2.00 | -1.92 |
| BUVA | -1.64 | -1.89 | -1.50 | -1.82 | -1.50 |
| FAST | -1.54 | -1.60 | -1.55 | -1.85 | -1.69 |

| Issuer Code | 2015 | 2016 | 2017 | 2018 | 2019 |
|----------------|-------|-------|-------|-------|-------|
| HOTL | -0.86 | -0.51 | -0.68 | -0.34 | -0.12 |
| ICON | -0.75 | -0.56 | -1.12 | -1.89 | -2.73 |
| INPP | -3.30 | -3.28 | -2.31 | -2.24 | -4.29 |
| JHHD | -2.58 | -2.93 | -2.96 | -3.01 | -2.84 |
| JSPT | -2.69 | -2.68 | -2.64 | -2.67 | -2.08 |
| KPIG | -3.25 | -3.72 | -3.60 | -2.99 | -3.25 |
| PANR | -0.06 | -0.48 | -1.25 | -1.14 | -1.10 |
| PDES | -1.25 | -1.34 | -1.44 | -1.26 | -0.94 |
| PJAA | -2.26 | -1.54 | -1.89 | -1.60 | -1.84 |
| PNSE | -2.48 | -1.71 | -2.09 | -2.01 | -1.72 |
| PSKT | 0.32 | -0.56 | -3.37 | -3.41 | -3.35 |
| PTSP | -1.22 | -1.32 | -1.48 | -1.92 | -2.03 |
| SHID | -2.28 | -2.33 | -2.15 | -2.20 | -2.17 |
| <i>Maximum</i> | 0.32 | -0.48 | -0.68 | -0.34 | -0.12 |
| <i>Minimum</i> | -3.30 | -3.72 | -3.60 | -3.41 | -4.29 |

Based table 3, the Zmijewski X-Score model has a cut off point of 0, where if the X score is more than 0 ($X > 0$) then the company is said to be distressed, but if the score is below 0 ($X < 0$) it is said to be healthy. This model gives very different results from the two previous models, a healthy company condition dominates in this model. There is only 1 company with a distress condition, namely PSKT in 2015 with a score of 0.32. In the following year, none of the companies were distressed.

Table 4. Calculation of the Grover G-Score Model

| Issuer Code | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------|-------|------|-------|-------|-------|
| BAYU | 0.62 | 0.69 | 0.75 | 0.82 | 0.93 |
| BUVA | -0.03 | 0.16 | -0.22 | -0.15 | -0.36 |
| FAST | 0.38 | 0.68 | 0.60 | 0.72 | 0.61 |
| HOTL | -0.39 | 0.25 | 0.22 | 0.28 | -0.04 |
| ICON | 0.50 | 0.67 | 0.79 | 1.08 | 1.35 |
| INPP | 0.21 | 0.28 | 0.09 | 0.18 | 1.09 |
| JHHD | 0.16 | 0.09 | 0.15 | 0.14 | 0.08 |
| JSPT | 0.74 | 0.56 | 0.43 | 0.64 | 0.36 |
| KPIG | 0.39 | 1.00 | 0.73 | 0.50 | 0.27 |
| PANR | 0.30 | 0.35 | 0.49 | 0.23 | 0.30 |
| PDES | 0.20 | 0.47 | 0.46 | 0.18 | 0.23 |
| PJAA | 0.54 | 0.25 | 0.41 | 0.28 | 0.40 |
| PNSE | 0.44 | 0.32 | 0.49 | 0.07 | 0.08 |

| Issuer Code | 2015 | 2016 | 2017 | 2018 | 2019 |
|----------------|-------|-------|-------|-------|-------|
| PSKT | -0.78 | -0.53 | -0.05 | -0.03 | 0.11 |
| PTSP | 0.17 | 0.22 | 0.23 | 0.47 | 0.46 |
| SHID | 0.10 | 0.08 | 0.29 | 0.31 | 0.28 |
| <i>Maximum</i> | 0.74 | 1.00 | 0.79 | 1.08 | 1.35 |
| <i>Minimum</i> | -0.78 | -0.53 | -0.22 | -0.15 | -0.36 |

In table 4, The Grover model has three classifications of conditions, namely healthy, gray area and distress. If the G-Score shows less than -0.02 ($G < -0.02$) then the company is said to be distressed, if it is more than 0.01 ($G > 0.01$) then the company is said to be healthy, and if the G-score is between 0.01 and -0.02 ($0.01 < G < -0.02$) then the company enters the gray area. Based on table 4, there are no companies in the gray area, but this model shows quite varied results. In 2015, there were 3 companies experiencing distress conditions with the lowest score obtained, namely -0.78 for PSKT issuers, and 13 other companies that were in healthy condition with the highest score obtained by JSPT issuers namely 0.74. In 2016, there was only 1 company that experienced a distress condition, namely PSKT with a value of -0.53 and 15 other companies had a healthy condition with the highest gain of 1.00 by KPIG issuers. In 2017, 2018 and 2019 companies that experienced a healthy condition with the highest score were obtained by issuers of ICON with a score of 0.79; 1.08; and 1.35, while the distress condition with the lowest score was experienced by BUVA issuers in the three years with a score of -0.22; -0.15; -0.36.

Table 5. Comparison of Financial Distress Models

| No. | Prediction Model | Comparison Results | | | total | Level of accuracy |
|-----|---------------------|---------------------------|------------------|---------------------|-------|-------------------|
| | | <i>Financial Distress</i> | <i>Gray Area</i> | <i>Non Distress</i> | | |
| 1 | Altman (Z-Score) | 8 | 27 | 45 | 80 | 10% |
| 2 | Springate (S-Score) | 55 | 0 | 25 | 80 | 68.75% |
| 3 | Zmijewski (X-Score) | 1 | 0 | 79 | 80 | 1.25% |
| 4 | Grover (G-Score) | 10 | 0 | 70 | 80 | 12.5% |

The level of accuracy is calculated using the formula:

| | | | |
|--------------------------|---|--------------------------------------|---------------|
| Level of accuracy | = | Number of Correct Predictions | X 100% |
| | | Number of Samples | |

Based on the calculation of the level of accuracy (table 5) through the formula above, it can be seen that the most accurate model in predicting financial distress in the tourism, hospitality, and restaurant subsectors listed on the Indonesia Stock Exchange is the Springate S-Score with the highest percentage gain of 68.75%

5. Conclusion and Recommendation

5.1 Conclusion

Based on the results and discussion above, it can be concluded:

1. The Altman Z-Score model predicts 2 companies' financial distress, with 6 companies in gray area, and 8 companies in healthy condition in 2015 and 2016. In 2017 this model only predicts 1 company in financial distress,

with the gray area 5 companies, and 10 other companies are in healthy condition. Then 2018 the financial distress condition in this subsector was 1 company, with 7 companies in gray area and 8 companies in healthy condition. In 2019, there were 2 companies with indications of financial distress, 3 companies in the gray area and 11 other companies in healthy conditions.

2. The Springate S-Score model predicts 12 companies that financial distress in 2015, with 4 companies in a healthy condition that year. Then in 2016, 10 companies were in distress and 6 were healthy. In the following three years, there were 11 companies that indicated financial distress, with 5 of them experiencing a healthy condition.

3. The Zmijewski X-Score model provides results that dominate healthy companies in the last five years, but there is only 1 company that is in distress, namely in 2015.

4. The Grover G-Score model predicts financial distress of 3 companies in 2015 and 13 of them have a healthy condition. Then in 2016 there was only 1 company whose condition was in distress in this subsector with 15 other companies in healthy condition. In 2017, 2018 and 2019 there were 2 companies that had distress conditions and 14 other companies were in healthy condition.

5. The four models used, namely the Altman Z-Score, Springate S-Score, Zmijewski X-Score, and Grover G-Score have different levels of accuracy in predicting financial distress. Based on the accuracy level table, the Springate S-Score model is the model that has the highest accuracy rate, namely 68.75%.

5.2 Recommendation

Based on the conclusions above. So the suggestions that can be given by researchers are as follows:

1. Companies in this sub-sector can anticipate through developing existing strategies or evaluating these strategies.
2. For stakeholders, the decisions taken will be better if they analyze the company's financial condition so as not to harm one of the parties in the future.
3. The researcher calculated financial distress using 4 models, namely the Altman Z-Score, Springate S-Score, Zmijewski X-Score, and Grover G-Score. For further researchers, it can predict financial distress with other models such as Ohlson, Fulmer, CA-Score, and other models that can be compared in predicting financial distress. In addition, further researchers can analyze external factors in predicting financial distress.

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