

Analysis of Bankruptcy Prediction Models in Determining Bankruptcy of Consumer Goods Companies in Indonesia

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Abstract – this study aimed at analyzing three different bankruptcy prediction models: the Altman model, the Grover model and the Zmijewski model in predicting bankruptcy in the public consumer goods: sub-sector food and beverage. the reseacher took data in the form of financial statements from the Indonesia Stock Exchange in 2015-2018. there were 11 sample companies selected using the purposive sampling method. The research found that the Altman Z score model got an accuracy rate of 47.7% score against bankruptcy predictions ; whereas, the Grover G model and the Zmijewski X model got an accuracy rate of 100% score against bankruptcy predictions. In addition, the result of the analysis of ALTO and companies in the gray area position proved that the Altman Z score is also not feasible. Therefore, the study concluded the Grover G model and the Zmijewski Model are the most significant bankruptcy prediction models to use in predicting bankruptcy of public companies consumer goods: sub-sector food and beverage in Indonesia. It implied to the public companies consumer goods: sub-sector food and beverage in Indonesia in order to choose the appropriate bankruptcy prediction models to achieve the maximum accuracy.

Keywords - Consumer Goods, Bankruptcy Prediction Models, Food and Beverage

I. INTRODUCTION

The consumer goods industry is a strategic industry because it produces primary goods consumed by the public, of course, companies engaged in this industry must always be considered for their survival. Any problems that occur in this industry have a direct impact on the scarcity of consumer goods. This has an impact on the disruption of the national food supply. The problem that occurs in some cases in consumer goods companies is that the company almost experienced financial distress but still operates as if nothing will happen. Sariwangi tea producer PT Sariwangi Agricultural Estates Agency (Sariwangi AEA) has been declared bankrupt and hundreds of employees are waiting for their fate. Then it was stated by the Ministry of Industry that Sariwangi's bankruptcy was more related because of internal company problems, according to Poskota Daily on 30 October 2018. Related to this case, as disclosed by cnbcindonesia.com that 3 companies under the auspices of PT Tiga Pilar Sejahtera, PT Jatisari Srijeki, PT Indoberas Unggul and PT Sukses Abadi Karya Inti have been declared bankrupt by the Semarang Commercial Court for being unable to repay debts of Rp. 1.4 trillion to separatist creditors and Rp. 2.5 trillion to concurrent creditors. Then continued in id.wikipedia.org it was stated that PT Nyonya Meneer was declared bankrupt by the Semarang District Court on August 14, 2017 because it was unable to repay a debt of Rp.252 billion.

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According to Elmabrok, 2012, that the occurrence of financial distress or bankruptcy because the amount of liabilities exceeds the fair value of assets or the amount of current debt exceeds the amount of current assets. Further explained by June Li, 2012, that when bankruptcy occurs in companies tends to have an impact on the world economy. Ghosh, 2013, revealed that the bankruptcy of the company began with a continuous and prolonged decline in the company's financial condition or better known as financial distress. Early warning should be needed to minimize the number of companies that go bankrupt. According to Nidhi and Saini, 2013, that early warning can be used only by using a standard financial ratio. Corporate bankruptcy leaves a bad impression, both for the owner, management, suppliers, creditors and for the public. From the case revealed above it turns out that the core problem lies in the inability of the company to pay debts that are due soon. Actually, before bankruptcy, there are methods that can be used to predict bankruptcy, namely the Altman Z score model, the Grover G score model and the Zmijewski X score model. The purpose of this study is to provide recommendations, which model can be used by considering the maximum level of accuracy.

II. LITERATURE REVIEW

a. Bankruptcy Prediction with the Altman Model

Edward I Altman, 1968 revealed that by using certain financial ratios can predict the level of potential bankruptcy, especially companies engaged in the manufacturing sector rather than the financial sector. Arjum, 2012 that by using this bankruptcy prediction measurement method can be known earlier the occurrence of bankruptcy for the next one, two and three years. In addition, Hayes, 2010, Odipo and Srati, 2010 confirmed that this Altman model has an accuracy rate exceeding 80%. This financial ratio was obtained from adequate research so that it found a reliable Altman Z score model to be used in manufacturing companies, after several corrections were made to the general Altman Z score formulation. The Altman Z score of the corrected 1983 results are: $Z \text{ score} = 0.717 \text{ WCTA} + 0.847 \text{ RETA} + 3,107 \text{ EBITTA} + 0.420 \text{ MVEBVD} + 0.998 \text{ STA}$, where WCTA = working capital to total assets, RETA = retained earnings to total assets, EBITTA = earnings before interest and taxes to total assets, MVEBVD = market value equity to book value of total debt, and STA = sales to total assets. Potential bankruptcy status levels are measured by the range of cut-off as follows: $Z \text{ score} > 2.6$, companies in healthy condition, score 1.1 - 2.6, companies in vulnerable conditions need improvement (grey area), and $Z \text{ score} < 1.1$, companies have the potential to lead to serious bankruptcy so that it can lead to bankruptcy. To test the differences of the three models, the hypotheses that can be raised are:

Hypothesis 1: There are differences in potential bankruptcy between the Altman model, the Grover model and the Zmijewski model

Hypothesis 2: The Altman model is recommended to have a higher level of accuracy than the Grover model and the Zmijewski model

b. Bankruptcy Prediction with the Grover Model

Jeffrey S. Grover, 2001 redesigned the Altman Z score model by adding 13 new financial ratios and was used for research conducted on 70 sample companies, namely 35 bankrupt companies and 35 healthy companies in the period 1982-1996. The Grover G score model used with the function: $G \text{ Score} = 0.057 + 1,650 \text{ WCTA} + 3,404 \text{ EBITTA} - 0.016 \text{ ROA}$, where WCTA = working capital to total assets, EBITTA = earnings before interest and taxes to total assets, and ROA = net income to total asset. To determine the status of the potential bankruptcy level

measured by the range of cut-offs as follows: $G \text{ Score} \leq -0.02$, it means the company has the potential to go bankrupt and the value of $G \text{ Score} \geq 0.001$, it means the company is in good health.

Hypothesis 3: The Grover model is recommended to have a higher level of accuracy than the Altman model and the Zmijewski model

c. Potential Bankruptcy with the Zmijewski Model

Zmijewski, 1984 emphasized that the determination of samples must be from the beginning so that the frequency of bankruptcy is known, by dividing the number of companies that went bankrupt by the number of sample companies. The Zmijewski model has an accuracy rate of 94.9%. The Zmijewski model is $X \text{ score} = -4.3 - 4.5 \text{ ROA} + 5.7 \text{ DEBT} - 0.004 \text{ CR}$, where $\text{ROA} = \text{net income to total assets}$ or ROA , $\text{DEBT} = \text{total liability to total assets}$ or debt ratio , and $X3 = \text{total assets to total liabilities}$ or current ratio . To determine the status of the potential level of bankruptcy measured by the range of cut-offs as follows: If the value of $X \text{ Score} > 0$ then the company has the potential to go bankrupt, but if the value of $X \text{ Score} < 0$ then the company is healthy.

Hypothesis 4: The Zmijewski model is recommended to have a higher level of accuracy than the Altman model and the Grover model

III. DATA COLLECTION

This research is causal-comparative research, meaning that research is conducted on a fact after the fact that it happened. This study examines the causal relationship of two or more variables, where the facts that occur are the potential for bankruptcy as the dependent variable, whereas, the influencing variable as the independent variable is the bankruptcy prediction model. The data used are secondary data in the form of financial statements from public companies engaged in the consumer goods industry during the 2015-2018 period. Sample selection is determined by purposive sampling method by reducing the number of companies that cannot meet certain criteria. SPSS 23 is used for data processing, which produces descriptive statistics, the hypothesis test with kruskal wallis is a non-parametric test used to distinguish the results of the Altman, Grover and Zmijewski models, Error type is used to determine the level of accuracy in each model studied.

IV. DATA ANALYSIS

Based on data from 11 companies, namely: ALTO, CEKA, ICBP, INDF, MYOR, PSDN, BREAD, SKBM, SKLT, STTP, ULTI calculated with Z scores, G scores and X scores for 4 years of research resulting in Z scores, G scores and X score; Then, determine the status of potential bankruptcy with the above criteria. From descriptive statistics it is known that the Altman model has a minimum value of 0.424, a maximum of 14,928, a mean of 3,025 and a standard deviation of 2,299, and a Grover model has a minimum of 0.0055, a maximum of 5,491, a mean of 1,007 and a standard deviation of 1,143; whereas, the Zmijewski model has a minimum of -4.085, a maximum of -0.288, a mean of -2.043 and a standard deviation of 0.968.

The Kaillal Wailis Test shows that the Asymp value. Sig of all models, namely the Altman model, the Grover model and the Zmijewski model < 0.05 so that there are differences in the potential for bankruptcy in the Altman model, the Grover model and the Zmijewski model. Thus, H_0 is rejected and H_1 is accepted. At the accuracy level of the Altman model it is known that the magnitude of bankruptcy (error) prediction, gray area and healthy of all sample companies during the 4 year study period amounted to 4 bankrupt data, 19 gray area data and 21 healthy

data, so the accuracy level can be calculated as follows $4 / 44 \times 100\% = 9.1\%$, $19/44 \times 100\% = 43.2\%$ and $21/44 \times 100\% = 47.7\%$. The accuracy of the Grover Model shows that 44 data from 11 companies were 100% healthy so that H_0 was rejected and H_2 was accepted. In this case, the Zmijewski Model shows that all companies are categorized as healthy companies because H_0 is rejected and H_3 is accepted.

V. ANALYSIS OF THE GROVER MODEL AND THE ZMIJEWSKI MODEL

Based on the results of hypothesis testing it is known that there are differences between the Altman model, the Grover model and the Zmijewski model in measuring the prediction of potential bankruptcy in the consumer goods industry. The Altman model emphasizes the special measurement aspects of retained earnings to total assets, market value equity to book value of total assets and sales to total assets because two other ratios than the Altman model already exist in other models. Based on the results of calculations revealed that the Altman model has an accuracy rate of bankruptcy prediction of only 47.7%, the gray area level of 43.2% and an error of 9.1%. In contrast to testing on the Grover model and the Zmijewski model shows the highest accuracy rate of bankruptcy prediction, which is 100%. Grover's model has the same financial ratios as the Altman model, this means that the Altman special ratio has reduced the accuracy of bankruptcy predictions on the Altman model itself. In contrast to the Zmijewski model, the Zmijewski model adds that the debt ratio on the model actually increases the accuracy rate of bankruptcy predictions to 100%.

In the Altman model there is a vulnerability in business continuity from a potential bankruptcy of 43.2% with the status of grey area. Companies that are in the gray area if not immediately addressed have the potential to go bankrupt. The ratio of retained earnings to total assets used in the Altman model is highly dependent on the company's dividend policy, and this dividend policy is determined by the harmonious relationship between the principal and the agent. The relationship between the existence of the ratio of retained earnings to total assets with the potential for bankruptcy is considered less relevant. The Altman model also includes a market value of equity to book value to book value of debt ratio, this ratio is less relevant when it is associated with the accuracy rate of bankruptcy predictions due to difficulties in determining the market value of equity, and even a difficulty in determining the book value of debt. It is these difficulties that make the Altman model not recommended for use in predicting bankruptcy because of its low level of accuracy.

With the Altman model, ALTO as a natural mineral water company went bankrupt during 2015-2018, but using the Grover model and the Zmijewski model it turns out that ALTO is categorized as a healthy company with an accuracy rate of 100%. Large companies such as INDF and ICBP received support from PT Indofood so as to achieve a net profit growth in 2019 of 13.0% and 10.24%, respectively. ROTI and SKBM based on the calculation of the Altman model for 4 years are categorized as being in the gray area, meaning companies that have the potential to experience bankruptcy with an accuracy rate of 43.2%. SKBM always provides dividends every year, a policy that is not possible by companies in the grey area. MYOR, which decreased by 0.51%, is still classified as a healthy company.

VI. STUDY RESULTS, SUMMARY AND CONTRIBUTION

Food and beverage sub-sector companies are in a healthy condition based on the results of the analysis of the Grover model and Zmijewski model because the companies engaged in this sub-sector are mostly owned by groups which certainly have a higher level of security, and the food and beverage sub-sector is the primary needs

needed by the community. Therefore, it concluded the Grover G model and the Zmijewski Model are the most significant bankruptcy prediction models to use in predicting bankruptcy of public companies consumer goods: sub-sector food and beverage in Indonesia. It implied to the public companies consumer goods: sub-sector food and beverage in Indonesia in order to choose the appropriate bankruptcy prediction models to achieve the maximum accuracy.

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