Journal of Management Science (JMAS)
Volume 7, No. 3, July 2024, pp 485-492 ISSN 2684-9747 (Online)
www.exsys.iocspublisher.org/index.php/JMAS Published by: Institute of Computer Science (IOCScience)

Bankruptcy forecast of ades issuers 2018-2022: comparison of method accuracy and implications of results

Loso Judijanto
IPOSS Jakarta Indonesia

ARTICLE INFO

Article history:

Received Jul 2, 2024
Revised Jul 24, 2024
Accepted Jul 25, 2024

Keywords:

Bankruptcy Prediction Model Comparison;
Early Warning Of Bankruptcy;
Insolvency Prediction Model Accuracy;
Food And Beverage Sector.

ABSTRACT

This research aims to compare the level of precision of four insolvency forecasting models, namely the Grover, Springate, and Zmijewski models to forecast the probability of insolvency of ADES listed companies engaged in the food and beverage sector listed on the IDX. The source used is the company's financial statements during the period 2018-2022. After carrying out calculations with the four models, a comparison is made to see the difference in results between models from year to year. The study results indicate that there is an inequality of results between the Grover model and Altman Z-Score, Springate, and Zmijewski to predict the insolvency of ADES issuers. The Grover model prediction results only produce bankruptcy conditions in 2018, while for 2019 to 2022 it is normal so that it has the highest precision of 80%, followed by the Springate and Zmijewski models with 60% precision, and the Altman Z-Score with 20% precision. In this case, the performance improvements made by the company since 2019 are accommodated by the Grover Model while the other models only accommodate this several years later. The Revised Altman model appears to be the most conservative in providing bankruptcy predictions so that it is more likely to produce bankruptcy predictions even though there have been improvements in company performance for several years. The results of the analysis provide lessons regarding the validity of the model and the level of conservativeness of the model in accommodating performance improvements made by different issuers.

This is an open access article under the CC BY-NC license.

Corresponding Author:

Loso Judijanto,
IPOSS Jakarta Indonesia
Jl. Jenderal Sudirman No.86, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10220, Indonesia.
Email: losojudijantobumn@gmail.com

1. Introduction

Bankruptcy is a complex economic phenomenon that has a significant impact on various aspects of business life and society. The definition of bankruptcy has been the subject of discussion and analysis by various economic and financial experts. According to Sakti (2020), bankruptcy is defined as a condition in which the company is no longer able to pay off obligations. The definition emphasizes the financial aspects of the company, particularly the ability to meet financial obligations to creditors, suppliers, and other parties who have claims against the company (Setyaningrum et al., 2020). Meanwhile, Ridwan (2019) expanded the definition of bankruptcy by stating that it is the company's inability to operate in achieving its goals. This perspective is not just focused on financial aspects, but also includes the company's ability to operate effectively and achieve its strategic goals. This definition implies that bankruptcy can occur even when the company still has sufficient assets, but fails to optimize the utilization of resources in order to achieve business goals (Akbar & Ridwan, 2019). Rahman (2022) provides a more specific definition by defining bankruptcy as a condition in which the company faces insufficient funding in order to carry out business activities. This definition emphasizes the liquidity and cash flow aspects of the company which are critical factors in the continuity of daily operations. Insufficient funds can cause the company to be unable to pay salaries to employees, purchase raw materials, or pay other operational obligations which can ultimately stop all business activities (Diyani & Rahman, 2022).

From the various definitions above, it can be understood that bankruptcy is a condition in which a company faces the problem of inability to fulfill its obligations due to insufficient funds so that the company is unable to continue its business. This comprehensive definition covers the financial, operational, and strategic aspects of business failure. It is important to understand that bankruptcy is not a sudden event, but rather the result of a series of factors and decisions that accumulate over time. Factors that can contribute to corporate bankruptcy include poor management, ineffective business strategies, changing market conditions, intense competition, technological innovations that cannot be followed, legal or regulatory issues, and unforeseen events such as natural disasters or global economic crises. The impact of bankruptcy according to Putri (2023) is not only limited to the company itself, but also has a wide ripple effect on various stakeholders. Employees may lose their jobs and source of income, creditors may not be able to recover loans, suppliers lose customers, and shareholders lose dividend income from investments. More broadly, adds Juliani (2021), the bankruptcy of a large company can affect the local or even national economy, especially if the company is a major employer in an area or has a critical role in the supply chain of a particular industry (Putri, 2023; Rinofah et al., 2021). Given the serious consequences of bankruptcy, it is important for companies and stakeholders to have an early warning system that can detect early signs of financial distress. Financial ratio analysis, cash flow assessment, and monitoring industry trends are some of the tools that can be used to identify potential problems before they develop into an insurmountable crisis. On the other hand, it is interesting to note that amidst complex economic dynamics, some industry sectors are showing resilience and even significant growth. For example, in 2024, the food and beverage sector in Indonesia showed an encouraging performance with several companies recording relatively high share values. PT Indofood Sukses Makmur Tbk (INDF), one of the largest food conglomerates in Indonesia, recorded a share value of IDR 6,200 per share in June 2024. This achievement reflects investors' confidence in the company's fundamentals and long-term growth prospects. PT Indofood with its diversified product portfolio ranging from instant noodles to milk and baby food has successfully maintained its position as a market leader in various product categories.

PT Mayora Indah Tbk (MYOR), a producer of snacks and beverages known for brands such as Kopiko and Torabika posted the highest share price of IDR 2,380 during the same period. This strong stock performance shows the success of the company's strategy in product innovation and market expansion including to global markets. PT Garudafood Putra Putri Jaya Tbk (GOOD) recorded its highest share price of IDR 368, also showing solid performance. The company, known for products such as Garuda peanuts and Gery biscuits has managed to maintain its position in the domestic market while continuing to expand its export reach to various countries. Positive performance was also shown by PT Nippon Indosari Corpindo Tbk (ROTI), which produces Sari Roti products with the highest share value in June 2024 at Rp 1,000 per share. Despite facing challenges in the form of fluctuating raw material prices and changing consumer consumption patterns, the company has managed to maintain growth through product innovation and operational efficiency. PT Ultrajaya Milk Industry & Trading Company Tbk (ULTJ), which produces well-known UHT milk and beverages, recorded the highest share value in June 2024 at IDR 1,870 per share. This strong share performance reflects the company's success in capitalizing on the growing consumption trend of healthy dairy products and beverages among Indonesian consumers. The relatively high share prices of issuers in the food and beverage sector indicate strong company fundamentals and promising business prospects. Factors contributing to this positive performance include the continued growth of Indonesia's middle class, increasing awareness of healthy food and beverages, and the companies' success in product innovation and market expansion.

However, it is important to note that strong stock performance does not necessarily guarantee immunity to future bankruptcy risks. These companies need to remain vigilant against challenges such as intensifying competition, changing consumer preferences, fluctuating raw material prices, and potential macroeconomic shocks. Effective risk management, continuous innovation, and readiness to adapt quickly to market dynamics will remain key to long-term success. In a broader context, this example of positive performance from the food and beverage sector highlights the importance of economic diversification and the resilience of certain sectors in the face of economic challenges. While some industries may experience difficulties or even bankruptcy, other sectors can thrive, creating new opportunities for investment, innovation, and economic growth.promise.

It is also important to understand some of the bankruptcies of global food and beverage companies to learn from and provide context to the dynamics of the food and beverage sector. In 2015, Twinkie, a legendary US cookie manufacturer, filed for bankruptcy with $2.5 billion in debt. The bankruptcy was due to declining sales, intense competition and high labor costs (Reuters, 2015). In 2017 Australia's largest dairy company Murray Goulburn filed for bankruptcy after being abandoned by many milk supply farmers as the

company cut purchase prices. This led to a 20% drop in raw material supply (The Guardian, 2017). A year later, Latin American food company BRF SA had to shut down operations at eight factories in Argentina, Europe and Thailand due to a formaldehyde food scandal that caused losses of $400 million (Bloomberg, 2018). In 2019 iconic British ice cream producer Calippo declared bankruptcy. The 70-year-old company struggled with competition and changing consumer tastes (BBC News, 2019). Furthermore, in 2022 Starbuks closed 130 stores in Russia following the invasion of Ukraine. The closure triggered a $520 million loss for the coffee company (Business Standard, 2022).

The above cases show that financial problems, declining sales, loss of customers, and crises are the main causes of bankruptcy. This causes massive losses for the company as well as a domino effect on related business sectors. Therefore, bankruptcy prediction is important to detect potential company financial difficulties as early as possible.

Edward Altman in 1968 used Multiple Discriminant Analysis to identify financial ratios that can predict corporate bankruptcy. This model has been revised several times to be applied to private and non-manufacturing companies (Fatmawati, 2012). Anjum (2012) stated that this model has the ability to predict bankruptcy with high accuracy up to three years ahead of more than 80% as supported by Hayes et al. (2010) and Odipo and Sitati (2010). In this study, the model used is the Revised Altman's Z-Score using the formula:

$$Z = 0.717X1 + 0.847X2 + 3.107X3 + 0.420X4 + 0.988X5$$

where: X1 = Working Capital / Total Assets, X2 = Retained Earnings / Total Assets, X3 = Earnings Before Interest and Taxes / Total Assets, X4 = Book Value of Equity / Book Value of Total Debt, X5 = Sales / Total Assets

Companies with a score of less than 1.23 have the potential to face bankruptcy, scores between 1.23 and 2.90 are in the gray zone, and scores of more than 2.90 indicate companies do not have the potential to face bankruptcy.

The Grover model is a refinement of the Altman Z-Score developed by Jeffrey S. Grover. Grover utilized a sample of companies similar to the Altman Z-Score in 1968, but added new financial ratios (Soedarsa et al., 2019). Grover (2001) defines his model with the following formula (Aini et al., 2020; Arti & Ovami, 2022; Primasari, 2018; Wahyuningtyas & Fatmawati, 2021):

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

where: X1 = Working Capital / Total Assets, X3 = Earnings Before Interest and Taxes / Total Assets, ROA = Net Income / Total Assets

Grover's model predicts bankruptcy if the score is lower than or equal to -0.02 ($Z \leq -0.02$). Conversely, the company is predicted not to experience bankruptcy when it has a score greater than or equal to 0.01 ($Z \geq 0.01$).

Gordon L.V. Springate built a model to predict bankruptcy in 1978 based on the Altman procedure, using four financial ratios selected from 19 ratios derived from various literatures. The Springate model uses the formula (Prasetianingtias & Kusumowati, 2019; Reza et al., 2023):

$$S\text{-Score} = 1.03A + 3.07B + 0.66C + 0.4D$$

where: A = Working Capital / Total Assets, B = Net Income Before Interest and Taxes / Total Assets, C = Net Income Before Taxes / Current Liabilities, D = Sales / Total Assets

Companies with an S score of more than 0.862 are categorized as companies that do not have the potential to experience bankruptcy, while if the score is less than 0.862, it indicates that the company has the potential to experience bankruptcy.

The model to predict bankruptcy was initiated by Mark E. Zmijewski in 1984. The Zmijewski model uses the following formula (Artini & Ida Bagus Putra Astika, 2024; Martini et al., 2023; Supitriyani et al., 2022; Wahidah & Fikri, 2024):

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

where: X1 = ROA (Return on Asset) = Net Income / Total Assets, X2 = Leverage (Debt Ratio) = Total Liabilities / Total Assets, X3 = Liquidity (Current Ratio) = Current Assets / Current Liabilities.

If a company's score exceeds 0, the company is predicted to have potential bankruptcy. If the score is lower than 0, the company is predicted to have no potential bankruptcy.

2. Research Method

This study was conducted by analyzing ADES financial report data as a food and beverage sector issuer listed on the IDX during the period 2018 to 2022. The data was obtained by accessing the official IDX website.

ADES was chosen because it has unique performance characteristics, namely having severe problems in 2018 but then making efforts to improve performance so that it is still operating today. This change in performance is an indicator that needs to be studied whether it is well accommodated in models to predict bankruptcy that are widely used today.

Basically, this research is mixed methods, combining quantitative and qualitative approaches. The quantitative approach is used in calculating bankruptcy prediction results using 4 bankruptcy models commonly used today, namely the Revised Altman Model, Grover Model, Springate Model, and Zmijewski Model. After that, a comparison is made of the prediction results obtained and compared with the reality of the existence and continuity of ADES operations that are still operating today. Qualitative analysis is used to provide context and explanation regarding the comparison of predictive results with the level of accuracy shown by each predictive model to the reality of the existence and continuity of ADES operations.

By combining these quantitative and qualitative approaches, it is expected that a better understanding of the accuracy and characteristics of bankruptcy prediction models applied to the case of ADES issuers can be obtained. The results of this study are expected to provide a good empirical understanding of the applicability of each bankruptcy prediction model based on specific cases of companies in Indonesia, especially in the food and beverage sector.

3. Results And Discussions

ADES

PT Akasha Wira International Tbk (ADES) is a company that operates in the production and distribution of bottled drinking water (AMDK) along with personal care production. Initially in 1985 the company was formed under the name PT Alfindo Putrasetia. The company conducted its IPO on June 13, 1994. In 2000 there was a change in the company's name as PT Ades Waters Indonesia Tbk. In 2010, the company changed its name again as PT Akasha Wira International Tbk until now. The company is headquartered in South Jakarta and has factory locations in Bogor, Pasuran, Pulogadung and Sukabumi.

In general, ADES operates in two main business segments:

1. Bottled Drinking Water (AMDK)

For bottled water products, the company uses the `Nestle Pure Life` and `Vica Royal` brands. Commercial production started in 1986 using the `AdeS` and `Vica` brands. In 2007 the company launched the production of drinking water in gallon containers using the `Vica Royal` brand.

2. Personal Care Products

For personal care products the brand used is `Makarizo`. The company started hair care cosmetics in 2010 after acquiring production equipment and supplies from PT Damai Sejahtera Mulia.

In 2012 the company signed an agreement with Procter & Gamble to import, distribute, and sell professional premium segment products such as `Wella` and `Clairol Professional`. In 2014 the company expanded by starting the production of soy-derived milk beverages under the `Pureal` brand as part of product diversification.

Comparison of Bankruptcy Prediction Model Results

Based on the use of relevant financial ratios data in accordance with the formula of each bankruptcy prediction model, the bankruptcy prediction score results and conclusions in accordance with the cut-off criteria for each bankruptcy prediction model are shown in Table 1.

Table 1. Comparison of Bankruptcy Prediction Model Results

Prediction Model	2018	2019	2020	2021	2022
Revised Altman	-3.125	-1.723	-0.068	1.198	2.998
Prediction	Bankrupt	Bankrupt	Bankrupt	Bankrupt	Normal
Grover	-1.698	0.399	0.587	1.399	2.589
Prediction	Bangkrut	Normal	Normal	Normal	Normal
Springate	-1.259	0.597	0.923	2.499	4.689
Prediction	Bankrupt	Bankrupt	Normal	Normal	Normal
Zmijewski	2.279	2.873	-0.902	-1.533	-2.967
Prediction	Bankrupt	Bankrupt	Normal	Normal	Normal

Source: Data processed

Based on the information in Table 1, it can be seen that all models provide the same conclusion that in 2018 ADES's financial condition is poor so that all models show the same consistent results, indicating bankruptcy.

The Revised Altman Z-Score model uses a critical point (cut-off) at a value of 1.23. Thus the Revised Altman model provides bankruptcy results for ADES from 2018 to 2021. Starting in 2022 Revised Altman produces predictions that do not indicate bankruptcy.

According to the calculation results of the Grover Model which uses a cut-off threshold of -0.02, it indicates that the company only faces bankruptcy problems in 2018, while from 2019 to 2022 it shows that the company does not face bankruptcy problems. This result indicates that the Grover model is very responsive to performance improvements made by company management so that since 2019 it is no longer shown as a company experiencing bankruptcy.

The Springate model uses a threshold value (cut-off) of 0.862 to determine the prediction of company bankruptcy. With this limit, the ADES issuer is considered to be still experiencing bankruptcy from 2018 to 2019. The Zmijewski model sets 0 as a critical threshold in evaluating the financial prospects of business entities. Entities with values exceeding 0 are considered at high risk of financial distress, while those with values of 0 or less are considered relatively stable. The Zmijeski Model analysis of the ADES issuer shows similar results to the analysis obtained using the Springate Model.

It can be interpreted that the Grover Model indicates the highest optimism by being very responsive to accommodate the improvement in the performance of ADES issuers since 2019 has been declared not to experience bankruptcy.

The Revised Altman Z-Score approach is relatively more conservative and identifies that the performance improvements made by ADES issuers are only truly meaningful in changing bankruptcy status in 2022. Changes in financial ratio performance that occurred from 2018 to 2021 were considered insufficient to change bankruptcy status.

The Springate and Zmijewski methods produce identical conclusion patterns with a level of conservativeness between the Revised Altman Z-Score Model and the Grover Model.

However, it is important to interpret these predictive results by considering non-quantitative factors such as macroeconomic dynamics, corporate strategies, and governance practices. An in-depth analysis of these aspects is required to gain a holistic understanding of the financial health and long-term prospects of any business entity.

ADES Performance and Turnaround Issues

In the 2017-2018 period PT Akasha Wira International Tbk (ADES) faced several problems that affected the company's financial performance as follows:

1. Net Sales Decline

In 2018 ADES recorded a 1.25% decrease in net sales to Rp 804.3 billion from Rp 814.49 billion in 2017 (Ayuningtyas, 2019; Hidayat, 2019a). This decline was mainly due to lower revenue from the cosmetics production line, which fell 6.47% year-on-year to Rp 308.74 billion. Although drinking water sales grew slightly by 2.31% to Rp 495.54 billion, this was not enough to offset the decline in the cosmetics segment (Ayuningtyas, 2019).

2. Increase in Cost of Goods Sold

In addition to the decline in sales, ADES also experienced an increase in cost of goods sold by 10% year-on-year to Rp 415 billion in 2018. This increase resulted in the company's gross profit decreasing by 11% from Rp 438 billion in 2017 to Rp 389 billion in 2018. This increased cost of goods reduces the profit margin that the company can earn from its sales (Hidayat, 2019a).

3. Efficiency and Sales Expense Reduction Not Significant

To overcome its financial problems, ADES made efficiencies by reducing selling expenses by 21% to Rp 226 billion in 2018. While this helped reduce operating expenses, it did not fully compensate for the reduction in gross profit due to the increase in cost of sales (Hidayat, 2019a).

4. Increase in Cost of Revenue Ratio

ADES' cost of revenue ratio increased from 46.11% in 2017 to 51.62% in 2018. The increase in this ratio indicates that production costs relative to revenue are increasing, which has a negative impact on the company's profitability (Ayuningtyas, 2019).

5. Stock Free Float

ADES faces issues related to low stock free float, which affects the liquidity of the stock in the market. One of the options considered to address this issue is to conduct a stock split (Admin, 2024).

Overall, the main issues faced by ADES in 2017-2018 were declining net sales, particularly in the cosmetics segment, and rising cost of sales. Although the company managed to make efficiencies by reducing cost of sales, this was not enough to fully overcome the negative impact of declining sales and rising production costs. The combination of these factors caused the company's financial performance to be very poor during the period (Hagai Solaiman, 2021).

After facing a decline in performance in 2017-2018, PT Akasha Wira International Tbk (ADES) implemented several strategic steps in order to significantly improve the company's performance. The following are the significant performance improvement steps taken by ADES:

1. Operational Cost Efficiency

ADES focuses on operational cost efficiency as one of the main strategies to improve performance. This includes reducing selling expenses and tighter management of production costs. This efficiency is expected to reduce other expenses and increase the company's profit margin (Admin, 2019; Hidayat, 2019c).

2. Revamping Distribution Network

To overcome the decline in sales, ADES revamped its distribution network. These improvements aim to increase product distribution efficiency and ensure products can reach the market more effectively (Hidayat, 2019c).

3. Product Diversification

ADES also focuses on product diversification, especially in the bottled drinking water (AMDK) segment which is the largest contributor to the company's revenue. The AMDK segment showed positive growth, which helped stabilize the company's revenue despite the decline in the cosmetics segment (Hidayat, 2019c).

4. Cost of Goods Sold Reduction

The company managed to reduce cost of goods sold, which is one of the largest cost components. In the first quarter of 2019, ADES was able to reduce its cost of goods sold to Rp 45.48 billion, which contributed to an increase in the company's net profit (Hidayat, 2019b).

5. Net Profit Improvement

As a result of efficiency measures and distribution improvements, ADES managed to record a significant increase in net profit. In 2018, the company's net profit increased to Rp 53 billion from Rp 38 billion in the previous year, showing an increase of 36% (Hidayat, 2019c). In the first quarter of 2019, ADES' net profit grew by 28% compared to the same period the previous year (Hidayat, 2019b).

6. Decision Not to Distribute Dividends

In 2021 ADES decided not to distribute dividends to shareholders. This decision was made to strengthen the company's equity and prepare for sustainable growth, including investment in infrastructure and finance (Fitri, 2022).

7. Innovation and Strategy

ADES continues to innovate and expand distribution and strengthen its position in the domestic market. The company has also adopted sustainable practices through the reduction of plastic use and the development of more environmentally friendly containers that not only improve the company's image and reputation but are also attractive to investors who are concerned about environmental issues (Minsya, 2024).

The steps taken by ADES, such as operational cost efficiency, revamping the distribution network, product diversification, and reducing cost of goods sold, have succeeded in significantly improving the company's financial performance after facing a decline in performance in 2017-2018. As a result, ADES was able to increase net profit and financial stability of the company (Cahya, 2011; Nany & Pertiwi, 2022; Zulkarnain Zulkarnain & Wuri Mirawati, 2019).

In recent years ADES has proven a real improvement in financial performance as shown by the following indications: (a). In the first quarter of 2023 ADES recorded a net profit of Rp 89.4 billion, which increased from Rp 75.6 billion compared to the same period last year (Admin, 2023a), (b). In 2023 ADES recorded a net profit of Rp 395.8 billion, an increase from Rp 365.0 billion in 2022. The company's revenue also increased to Rp 1.5 trillion in 2023 from Rp 1.3 trillion in 2022 (Admin, 2023b), (c) ADES has also posted rising revenues with consistent net profit in recent years reflecting the company's effective management and operational efficiency (Minsya, 2024).

4. Conclusion

Based on the results and analysis of the study, it can be concluded that there is a significant inequality between the Grover Model and the Revised Altman Z-Score, Springate, and Zmijewski Models in predicting the bankruptcy of ADES listed companies that are still listed on the IDX in 2018-2022. The Grover model is the most responsive bankruptcy predictor to accommodate performance improvements made by management so that it no longer predicts the bankruptcy of ADES issuers since 2019. This model may be considered most appropriate by management that has made turnaround efforts to ensure that the performance improvement efforts made are positively assessed and appreciated immediately. However, bankruptcy predictions using any model need to be followed up with an in-depth analysis of qualitative factors such as macroeconomic

conditions, business strategy and corporate governance. Prediction results should also be interpreted carefully given the possible biases that can occur. As advice, food and beverage issuers in Indonesia need to improve operating efficiency, maintain liquidity, and manage debt prudently to prevent bankruptcy. Regular monitoring of financial performance is also important to detect potential difficulties as early as possible. Investors and creditors can utilize bankruptcy prediction models as an aid in making decisions, but it does not replace a thorough assessment of the company's business prospects. Future research is expected to explore the latest bankruptcy prediction models by testing them on various industry sectors. The use of longer data and macroeconomic variables as external factors can also enrich the analysis and improve the predictive power of the model. Thus, early detection of potential business failures can be more accurate and comprehensive. The research faced limitations, including a relatively short observation period and the focus on a single industry sector, which may affect the generalizability of the findings. Additionally, the study did not incorporate macroeconomic variables or qualitative factors, which are crucial in assessing the overall health and future prospects of companies. Future research should extend the observation period, include multiple industry sectors, and integrate macroeconomic variables to enhance the robustness and predictive power of bankruptcy models. Researchers are encouraged to develop and test newer models that account for qualitative factors such as corporate governance, business strategy, and management practices, ensuring a more comprehensive and accurate prediction of potential business failures.

References

Admin. (2019). *Lanjutkan Langkah Efisiensi, ADES Berusaha Perbaiki Kinerja Tahun Ini*. IPOTNews.

Admin. (2023a). *Financial Statement 1Q 2023 of ADES*. IPOTNews.

Admin. (2023b). *Financial Statements Full Year 2023 of ADES*. IPOTNews.

Admin. (2024). *Kena FCA ADES Pertimbangkan Opsi Stock Split Saham*. IPOTNews.

Aini, S. N., Saptantinah, D., & Harimurti, F. (2020). Analisis Ketepatan Model Altman, Zmijewski, Grover dan Springate dalam Memprediksi Kebangkrutan Perusahaan. *Jurnal Akuntansi Dan Sistem Teknologi Informasi*, *16*(1), 62–73.

Akbar, R., & Ridwan, R. (2019). PENGARUH KONDISI KEUANGAN PERUSAHAAN, UKURAN PERUSAHAAN, PERTUMBUHAN PERUSAHAAN DAN REPUTASI KAP TERHADAP PENERIMAAN OPINI AUDIT GOING CONCERN PADA PERUSAHAAN PERTAMBANGAN YANG TERDAFTAR DI BURSA EFEK INDONESIA TAHUN 2015-2017. In *Jurnal Ilmiah Mahasiswa Ekonomi Akuntansi* (Vol. 4, Issue 2, pp. 286–303). LPPM Unsyiah. https://doi.org/10.24815/jimeka.v4i2.12239

Arti, Y., & Ovami, D. C. (2022). Analisis Perbandingan Model Z Altman dan Model the Grover Dalam Mengukur Kesehatan Perusahaan Food and Beverages di Bursa Efek Indonesia. *Jurnal Multidisiplin Madani*, *2*(2), 765–778. https://doi.org/10.54259/mudima.v2i2.432

Artini, N. L. P. S., & Ida Bagus Putra Astika. (2024). Analisis Prediksi Kebangkrutan Menggunakan Model Altman, Springate, dan Zmijewski pada Perusahaan Sektor Consumer Cyclicals. *E-Jurnal Akuntansi*, *34*(3), 9659–9673. https://doi.org/10.24843/EJA.2024.v34.i03.p08

Ayuningtyas, D. (2019). *Penjualan ADES Turun Kok Laba Bisa Naik 39%*. CNBC Indonesia.

Cahya, A. P. (2011). Model Prediksi Financial Distress: Studi pada Perusahaan Manufaktur Sektor Konsumsi yang Terdaftar di Bursa Efek Indonesia. *JIMFEB Jurnal Ilmiah Mahasiswa FEB Universitas Brawijaya*, *4*(3), 410–419.

Diyani, L. A., & Rahman, H. A. (2022). Analisis Keuangan dan Prediksi Kebangkrutan Akibat Pandemi Covid-19. In *Jurnal Akuntansi Keuangan dan Bisnis* (pp. 411–420). Politeknik Caltex Riau. https://doi.org/10.35143/10.35143/jakb.v15i1.5326

Fitri, A. N. (2022). *Akasha Wira International (ADES) Absen Bayarkan Dividen Tahun Ini*. Business Insights.

Hagai Solaiman, K. (2021). Analisis Komparatif Laporan Keuangan PT Akasha Wira International Tbk. (ADES) dengan Industri Food and Beverages yang Terdaftar di Bursa Efek Indonesia Periode 2014-2019. *Jurnal Ekonomi Manajemen Sistem Informasi*, *2*(3), 259–277. https://doi.org/10.31933/jemsi.v2i3.377

Hidayat, A. (2019a). *Efisiensi Berhasil, Pendapatan ADES Turun tapi Laba Bisa Dikerek*. Business Insights.

Hidayat, A. (2019b). *Laba Akasha Wira International (ADES) Tumbuh 28% di Kuartal I 2019*. Kontan.Co.Id.

Hidayat, A. (2019c). *Produsen Air Minum ADES Pompa Kinerja dengan Efisiensi*. Business Insights.

Martini, R., Raihana Aksara, R., Rachma Sari, K., Zulkifli, Z., & Hartati, S. (2023). Comparison of Financial Distress Predictions with Altman, Springate, Zmijewski, and Grover Models. *Golden Ratio of Finance Management*, *3*(1), 11–21. https://doi.org/10.52970/grfm.v3i1.216

Minsya. (2024). *PT Akasha Wira International Tbk (ADES): Profil dan Sejarah*. Syariah Saham.

Nany, M., & Pertiwi, Y. (2022). Analisis Kinerja Keuangan Perusahaan yang Melakukan Akuisisi di Bursa Efek Indonesia. *Sosio E-Kons*, *14*(3), 274. https://doi.org/10.30998/sosioekons.v14i3.14257

Prasetianingtias, E., & Kusumowati, D. (2019). Analisis Perbandingan Model Altman, Grover, Zmijewski Dan Springate Sebagai Prediksi Financial Distress. *Jurnal Akuntansi Dan Perpajakan*, *5*(1), 1–3. https://doi.org/10.26905/ap.v5i1.3072

Primasari, N. S. (2018). ANALISIS ALTMAN Z-SCORE, GROVER SCORE, SPRINGATE, DAN ZMIJEWSKI SEBAGAI SIGNALING FINANCIAL DISTRESS (Studi Empiris Industri Barang-Barang Konsumsi di

Indonesia). *Accounting and Management Journal*, *1*(1). https://doi.org/10.33086/amj.v1i1.70

Putri, S. M. (2023). Analisis Resiko Kebangkrutan Pt Superkrane Mitra Utama Dengan Metode Z Score Dan Zmijewski Periode Tahun 2017-2019. In *BISMA : Business and Management Journal* (Vol. 1, Issue 3, pp. 23–29). Kalimasada Group. https://doi.org/10.59966/bisma.v1i3.518

Reza, M. J., Pagalung, G., & Damayanti, R. A. (2023). Bankruptcy Prediction With the Altman Z-Score, Springate, Zmijewski, and Grover Models. *Contemporary Journal on Business and Accounting*, *3*(02), 118–135. https://doi.org/10.58792/cjba.v3i02.40

Rinofah, R., Sari, P. P., & Juliani, T. (2021). Pengaruh Kinerja Keuangan terhadap Financial Distress pada Perusahaan Manufaktur Sub Sektor Industri Barang Konsumsi Makanan dan Minuman yang Terdaftar di Bursa Efek Indonesia Periode 2016 - 2020. In *Al-Kharaj : Jurnal Ekonomi, Keuangan & Bisnis Syariah* (Vol. 4, Issue 3, pp. 726–744). Institut Agama Islam Nasional Laa Roiba Bogor. https://doi.org/10.47467/alkharaj.v4i3.719

Setyaningrum, K. D., Atahau, A. D. R., & Sakti, I. M. (2020). ANALISIS Z-SCORE DALAM MENGUKUR KINERJA KEUANGAN UNTUK MEMPREDIKSI KEBANGKRUTAN PERUSAHAAN MANUFAKTUR PADA MASA PANDEMI COVID-19. In *Jurnal Riset Akuntansi Politala* (Vol. 3, Issue 2, pp. 74–87). Politeknik Negeri Tanah Laut. https://doi.org/10.34128/jra.v3i2.62

Soedarsa, H. G., Indrayenti, I., & Apriyanto, N. M. O. (2019). ANALISIS MODEL ALTMAN Z-SCORE DALAM MENGUKUR POTENSI KEBANGKRUTAN PERUSAHAAN (STUDI EMPIRIS PADA PERUSAHAAN INDUSTRI BARANG KONSUMSI YANG TERDAFTAR DI BURSA EFEK INDONESIA TAHUN 2013 – 2017). In *Jurnal Akuntansi dan Keuangan* (Vol. 10, Issue 2, p. 28). Universitas Bandar Lampung Publication Center. https://doi.org/10.36448/jak.v10i2.1287

Supitriyani, S., Astuti, A., & Azwar, K. (2022). Implementation of Springate, Altman, Grover and Zmijewski Models in Measuring Financial Distress. *International Journal of Trends in Accounting Research*, *3*(1), 001–008. https://doi.org/10.54951/ijtar.v3i1.169

Wahidah, A. N., & Fikri, M. (2024). Prediction of Financial Distress Levels in State-owned Cipta Karya Companies using the Altman Z-Score, Springate, and Zmijewski Models. *COSTING: Journal of Economics, Business and Accounting*, *7*, 9091–9100.

Wahyuningtyas, E. T., & Fatmawati, S. (2021). DAMPAK RASIO KEUANGAN DAN PERTUMBUHAN PERUSAHAAN TERHADAP FINANCIAL DISTRESS MELALUI ANALISA SPRINGATE, ZMIJEWSKI, GROVER DAN ALTMAN Z-SCORE. In *Accounting and Management Journal* (Vol. 5, Issue 2, pp. 56–66). Universitas Nahdlatul Ulama Surabaya. https://doi.org/10.33086/amj.v5i2.2489

Zulkarnain Zulkarnain, & Wuri Mirawati. (2019). Karakteristik Dewan Direksi dan Pengaruhnya terhadap Kinerja Keuangan Perusahaan. *Cakrawala Repositori IMWI*, *2*(2), 72–81. https://doi.org/10.52851/cakrawala.v2i2.31