Comparison Of Corporate Bankruptcy Predictions Based On The Altman Model And Springate Approach

Case Study of the Technology Sector Listed on the IDX for the 2021-2023 Period

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ABSTRACT

This study was conducted to determine the financial performance of technology sector companies from the analysis of bankruptcy prediction using the Altman Z-Score and Springate S-Score methods and compare the accuracy and type error of the two methods in the 2021-2023 period. This study uses secondary data obtained from the Indonesia Stock Exchange using quantitative descriptive analysis techniques. The determination of the sample in this study uses a nonprobability sampling method, precisely with a purposive sampling technique. The results of this study show that based on the Altman Z-Score method, there are 4 technology sector companies that have the potential to experience bankruptcy for 3 consecutive years, including ATIC, DIGI, CASH, ENVY. Based on the Springate S-Score method, it is indicated that 4 companies have the potential to go bankrupt for 3 consecutive years, including DGI, CASH, ENVY, CYBR. The accuracy and type error rate obtained for three years in technology sector companies based on the Springate S-Score method resulted in a higher accuracy of 72% in 2022 with lower type errors compared to the Altman Z-Score method.

Keywords: *Technology Sector, Bankruptcy, Altman Z-Score, Springate S-Score*

ABSTRAK

Penelitian ini dilakukan untuk mengetahui kinerja keuangan perusahaan sektor teknologi ditinjau dari analisis prediksi kebangkrutan dengan menggunakan metode Altman Z-Score dan Springate S-Score serta membandingkan tingkat akurasi dan type error dari kedua metode tersebut dalam periode 2021-2023. Penelitian ini menggunakan data sekunder yang diperoleh dari Bursa Efek Indonesia dengan menggunakan teknik analisis deskriptif kuantitatif. Penentuan sampel dalam penelitian ini menggunakan metode nonprobability sampling, tepatnya dengan teknik purposive sampling. Hasil akhir penelitian ini menunjukkan bahwa berdasarkan metode Altman Z-Score terdapat 4 perusahaan sektor teknologi yang berpotensi mengalami kebangkrutan selama 3 tahun berturut-turut, diantaranya ATIC, DIGI, CASH, ENVY. Berdasarkan metode Springate S-Score terindikasi 4 perusahaan yang berpotensi bangkrut selama 3 tahun berturut-turut, diantaranya DIGI, CASH, ENVY, CYBR. Tingkat akurasi dan type error yang diperoleh selama

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tiga tahun di perusahaan sektor teknologi berdasarkan metode Springate S-Score menghasilkan akurasi yang lebih tinggi sebesar 72% di tahun 2022 dengan type error yang lebih rendah dibandingkan metode Altman Z-Score.

***Kata kunci**: Sektor Teknologi, Kebangkrutan, Altman Z-Score, Springate S-Score*

INTRODUCTION

Developed countries are countries with a very high level of economic development and technological infrastructure. Developed countries have industrial sectors that are always at the forefront and renewable with maximum and efficient use of resources. Over time, the industrial sector in developed countries has spread and has an impact on several developing countries such as Indonesia. With the use and application of this technology, it is hoped that the industrial sector in Indonesia will continue to increase rapidly.

The rapid development of the industrial sector in Indonesia is a benchmark for good economic growth in recent decades. Indicators of developed and developing countries can be measured through the rate of economic growth in a country. Economic growth is an indicator to assess the success of a country's economic development.

Based on data from the Central Statistics Agency (BPS) for the last 6 years, the year-on-year growth of Gross Domestic Product (GDP) in Indonesia before the Corona Virus Disease 2019 (COVID-19) pandemic was still stable at 5.07% in 2017, and rose to 5.17% in 2018, and there was a slight decline in 2019 to 5.02%. The COVID-19 pandemic in 2020 had a huge impact on Indonesia until there was a very drastic decline of -2.07% (Badan Pusat Statistik, 2024).

Source: Central Statistics Agency

Figure 1. Gross Domestic Product Growth in Indonesia

The significant decline in GDP in 2020 is closely related to several Large-Scale Social Restrictions (PSBB) policies which are one of the Government's strategies in suppressing the spread of COVID-19, so that it has a direct impact on almost all industrial sectors in Indonesia. The information and communication technology sector became the main sector that supported the economy during the COVID-19 pandemic, with a growth of 10.58% in 2020. This sector plays an important role in maintaining productive activities during social restrictions. In addition, the health services and social activities sector also showed growth (Kementerian Komunikasi dan Informatika, 2021).

Economic growth in the information and communication technology sector continued in 2021 with an increase of 6.81%. Although this figure is lower than the previous year, the growth is still higher than Indonesia's GDP growth of only 3.7%. In the following year, Indonesia's GDP reached 5.31% because Singapore and Indonesia were the two

main investment destinations for the digital technology sector in Southeast Asia. Indonesia attracts 25% of total private investment in the region and remains attractive to investors in the long term, along with Viet Nam and the Philippines (Google Indonesia, 2022).

The growth of private investment in 2022 is an opportunity for the technology sector in Indonesia. However, PT Limas Indonesia Makmur Tbk (LMAS), which is a publicly traded company in the technology sector, has stopped trading its shares since August 2022, due to the delay in submitting the 2021 audited financial statements and material information related to the closure of some or all the LMAS business segments. Previously, LMAS announced that it would cease the business activities of the stock market real-time data terminal on September 30, 2023, which would have an impact on the reduction in revenue. On January 30, 2023, the IDX requested an explanation from LMAS regarding the delay in the financial statements for the periods ending December 31, 2023, March 31, 2022, June 30, 2022, and September 30, 2022 (Angriani, 2023). LMAS explained that the delay was caused by problems recording financial statements at its subsidiary, PT Geotech System Indonesia. LMAS shares have been in suspension status since August 1, 2022, and will continue to be suspended until August 1, 2024.

Technology sector company PT Indosterling Technomedia Tbk (TECH) has also experienced a trading suspension on the Indonesia Stock Exchange (IDX) since August 7, 2023 for failing to fulfill its corporate obligations. This has an impact on the regular market and cash market to the sustainability of the company. One way to scientifically find out the potential for bankruptcy of a company from all aspects can be done by analyzing each ratio needed to see the relationship of each post in a financial report based on the Altman Z-Score and Springate S-Score methods. Therefore, in this study, a title can be raised "Comparison of Corporate Bankruptcy Predictions Based on the Altman (Z-Score) and Springate (S-Score) Model Approaches (Case Study of the Technology Sector for the 2021-2023 Period)".

LITERATURE REVIEW

Financial Report

Financial statements are the main tool used by management to assess the company's operational performance. According to (Mutiah, 2019) financial statements present information about the company's financial situation, which reflects financial performance over a certain period. Meanwhile, according to (Hery, 2020) it is explained that financial statements are the result of the process of recording and summarizing business transactions. Statement of Financial Accounting Standards (PSAK) No. 1 of 2022 Paragraph 9 defines financial statements as a systematic presentation of an entity's financial position and financial performance (Ikatan Akuntan Indonesia, 2022).

Bankruptcy Definition

The term "bankruptcy" comes from the French "*failite*" which means failure in payment. According to Indonesia law. 37 of 2004 article 1, bankruptcy is the general confiscation of all assets of bankrupt debtors, the management and settlement of which is carried out by the curator under the supervision of a judge in accordance with this law (Pemerintah Pusat Indonesia, 2004).

Factors that cause bankruptcy

When a company goes bankrupt, it means that they plan to cease operations and agree to liquidate all its assets to pay creditors and suppliers. Alternatively, they may file for bankruptcy restructuring to reorganize their entire business operations. In the case of restructuring, companies only choose this option after convincing creditors with their plan of action that they will be successful in future business operations (Monteiro, 2019).

Model Altman Z-Score

Altman Z-Score analysis is a financial performance evaluation model developed to assess the likelihood of bankruptcy of a company. This model was created by Edward I. Altman, a famous economist, in 1968. The model uses five financial ratios that are combined into one index and produce a Z score (Altman, 1968). The five ratios include: working capital to total assets, retained earnings to total assets, EBIT to total assets, equity market value to total debt, and sales to total assets. While useful, this method can initially only be applied to manufacturing companies whose shares are already listed on the stock exchange.

Based on the limitations of the previous model, in 1983 Altman developed his model so that it could be used for closed companies. This change also changed the name of the method to "Altman Z-Score Revised Method" because there are variable adjustments, such as changing the market value equity to book value equity, considering that companies that are not listed on the stock exchange do not have a market price for their equity (Sari, 2024).

Altman revised the Z-Score formula known as the "Altman Z-Score Modified Method" in 1995. This revision allows the model to be applied to all types of companies, both manufacturing, non-manufacturing, and bond issuing companies in developing countries (Ferdinandus, 2023). In this modified version, Altman omits the X5 variable sales to total assets because this ratio varies greatly depending on the size of the industry's assets. Therefore, the Altman Z-Score Modified Method can be applied, both in the manufacturing and non-manufacturing sectors. The following is the formula for the Modified Z-Score (1995):

$$Z = 6{,}56\ (X1) + 3{,}26\ (X2) + 6{,}72\ (X3) + 1{,}05\ (X4)$$

Information:
Z = Bankruptcy Index
X_1 = Working Capital to Total Assets
X_2 = Retained Earning to Total Assets
X_3 = Earnings Before Interest and Taxes to Total Assets
X_4 = Book Value of Equity to Book Value of Total Debt

Classification of company conditions based on the value produced, if the Z value < 1.1, indicates that the company has the potential for bankruptcy or financial distress. If the value range is $1.1 < Z < 2.6$, it indicates that the company is in a vulnerable condition or gray area. If the Z value > 2.6, it indicates that the company is in a stable or healthy condition.

Model Springate S-Score

The Springate S-Score analysis is one of the tools designed to predict the likelihood of a company's bankruptcy. This method was introduced by Gordon L.V Springate in 1978, using the Multiple Discriminant Analysis strategy and was created in response to doubts about the Altman Z-Score method regarding the market value of equity. The doubt focuses on whether the equity market value and the stock market value are the same or different (Ferdinandus, 2023).

The Springate method largely adopted the procedure from Altman. The model combines four financial ratios selected through a discriminatory analysis to produce a score that indicates the financial health of the company. These ratios include profit before interest and taxes to total assets, net profit to total assets, working capital to total assets, and sales to total assets (Sari, 2024). The following is the formula of the Springate method:

$$S = 1{,}03\ (X1) + 3{,}07\ (X2) + 0{,}66\ (X3) + 0{,}4\ (X4)$$

Information:
S = Bankruptcy Index
X_1 = Working Capital to Total Assets
X_2 = Earnings Before Interest and Taxes to Total Assets
X_3 = Earnings Before Tax (EBT) to Current Liabilities
X_4 = Sales to Total Asset

Classification of company conditions based on the value produced, if the S value < 0.862, indicates that the company has the potential for bankruptcy or financial distress. If the S value > 0.862, it indicates that the company is in a stable or healthy state.

Bankruptcy Prediction Accuracy Rate

The accuracy level is a test that aims to determine the extent to which the measurement results correspond to the actual value (Sari, 2024). This test is used to calculate the score of the right and wrong assessment with the level of accuracy and type of error of each prediction model. Accuracy indicates the percentage of correct predictions from the model for the entire sample tested. The following is a formula that can be used to measure the level of accuracy and type of error in each bankruptcy prediction method (Putri Ananda, 2023):

$$\text{Accuracy Level} = \frac{\text{Number of Correct Predictions}}{} \times 100\%$$

$$\textit{Type Error} = \frac{\text{Number of Errors}}{\text{Number of samples}} \times 100\%$$

METHODS

Type of Research

Based on the background of the problem and the title of this study, the researcher decided to use a type of quantitative descriptive research. Descriptive research is data analysis by describing or describing data that has been collected from the results of investigations of conditions, phenomena and various other facts, which will then be poured into the research report (Sugiyono, 2019). Quantitative research is defined as a research method used to study cause-and-effect relationships, predictions, or modeling used to research on a specific population or sample (Sugiyono, 2019). One of the goals of quantitative research is to predict the existence that occurs in a population.

Research Variables

The variables in this study used the Altman Z-Score Modified method with the calculation of four financial ratio indicators, namely: Working Capital to Total Assets, Retained Earning to Total Assets, Earning Before Interest and Taxes (EBIT) to Total Assets, Book Value of Equity to Book Value of Total Debt. Meanwhile, the Springate S-Score method uses four financial ratio indicators, namely: Working Capital to Total Assets, Earning Before Interest and Taxes to Total Assets, Earning Before Taxes to Current Liabilities, and Sales to Total Assets.

Samples and Sampling Techniques

The sample is part of the number and characteristics that are possessed by that population. The determination of the sample in this study uses a nonprobability sampling method, precisely with a purposive sampling technique. The purposive sampling technique is a sampling technique from a population based on certain considerations (Sugiyono, 2019). This means that sampling is based on certain considerations or criteria,

by selecting the entire available data (population). The sample is formulated first by the researcher with the following sampling techniques:

Table 1. Classification of Company Samples

No.	Sample Classification	Total Company
1	Technology sector companies that have been listed on the Indonesia Stock Exchange.	47
2	IT services and consulting industry companies, software industry, application industry and internet services, computer device industry, device industry, instrument & electronic devices that have been listed on the Indonesia Stock Exchange.	45
3	Companies that conduct initial stock issuance before 2024.	42
4	The company has published its annual financial statements for the 2021-2023 period.	25
	Number of Research Samples	**25**

Data, Data Sources and Data Collection Techniques

This research uses secondary data sources obtained by data collection techniques with Library Research, which requires data from various literary sources in the form of books, previous research journals and other materials that are closely related to problems in related entities, to obtain discussion as a source of research data. In addition, internet research data collection techniques also play a big role in data acquisition, namely, websites www.idx.co.id, www.bps.go.id, www.kominfo.go.id. The website provides all the necessary data information such as the country's economic conditions and financial statements of technology sector companies for the 2021-2023 period that have been published on the Indonesia Stock Exchange.

Data Analysis Techniques

1. Descriptive

The data analysis technique in this study uses the type of descriptive analysis in financial statements used to measure, know, and describe the potential for bankruptcy in technology sector entities listed on the Indonesia Stock Exchange. The entire financial statement data collected is then analyzed to be able to provide answers to the problems discussed in this study. In analyzing the data, the researcher used data analysis using the bankruptcy prediction model Altman Z-Score and Springate S-Score models.

2. Calculating the Altman Z-Score Formula

The Altman Z-Score Modified method is one of the reliable measuring tools that has been widely applied by researchers globally, both in the manufacturing and non-manufacturing sectors. The following is the formula for the Modified Z-Score (1995):

$$Z = 6{,}56\ (X1) + 3{,}26\ (X2) + 6{,}72\ (X3) + 1{,}05\ (X4)$$

Information:
Z = Bankruptcy Index
X_1 = Working Capital to Total Assets
X_2 = Retained Earning to Total Assets
X_3 = Earnings Before Interest and Taxes to Total Assets
X_4 = Book Value of Equity to Book Value of Total Debt

The classification of the company's condition based on the value produced, if the Z value < 1.1, indicates that the company has the potential for bankruptcy or financial

distress. If the value range is 1.1 < Z < 2.6, it indicates that the company is in a vulnerable condition or gray area. If the Z value > 2.6, it indicates that the company is in a stable or healthy condition.

3. Calculating the Springate S-Score Formula

Next is the Springate S-Score method which is a measure of financial distress/bankruptcy prediction by adopting several procedures from Altman. One of the similarities is the variables in the financial ratios measured, namely, Working Capital to Total Assets (WCTA) and Earnings Before Interest and Tax to Total Assets (EBITA) (Ferdinandus, 2023). The following is the formula of the Springate method:

$$S = 1{,}03\ (X1) + 3{,}07\ (X2) + 0{,}66\ (X3) + 0{,}4\ (X4)$$

Information:
S = Bankruptcy Index
X_1 = Working Capital to Total Assets
X_2 = Earnings Before Interest and Taxes to Total Assets
X_3 = Earnings Before Tax (EBT) to Current Liabilities
X_4 = Sales to Total Asset

Classification of company conditions based on the value produced, if the S value < 0.862, it indicates that the company has the potential for bankruptcy or financial distress. If the S value > 0.862, it indicates that the company is in a stable or healthy state.

The bankruptcy potential analysis procedure begins by entering the ratio components required by the formula, such as working capital, retained earnings, net income, revenue, total assets, total debt, and other components. Next, calculate the values that have been entered into the formula using the help of the Microsoft Excel application. The calculation results of each method will be in the form of a score, where the score will indicate the condition of the company (stable, vulnerable zone, or potential bankruptcy) based on the rules and limitations of each calculation method.

4. Calculating Accuracy and Type Error Levels

This test is used to measure the score of the right and wrong assessment with the level of accuracy and type of error of each prediction model for all samples of companies tested, with the formula of the level of accuracy and type of error as follows:

$$\text{Accuracy Level} = \frac{\text{Number of Correct Predictions}}{} \times 100\%$$

$$\textit{Type Error} = \frac{\text{Number of Errors}}{\text{Number of samples}} \times 100\%$$

RESULTS

Altman Z-Score Modification Method

Based on the Altman Z-Score Modified method (1995), this study uses four financial ratio indicators: Working Capital to Total Assets, Retained Earnings to Total Assets, Earnings Before Interest and Taxes to Total Assets, and Book Value of Equity to Book Value of Total Debt. These ratios are obtained from calculations based on data listed in each company's annual financial statements. After that, the financial statements are analyzed, and the relevant ratios are calculated. The process of calculating financial ratios is carried out using Microsoft Excel. The following are the results of research related to analysis and prediction with the Altman Z-Score Modified method:

1. Analysis of the Calculation Working Capital to Total Assets

Working Capital to Total Assets (WCTA) is the X1 variable in the Altman Z-Score method. This ratio is used to determine the amount of working capital formed from the

company's total assets. The following table shows the results of the WCTA calculation for 25 companies in the technology sector:

Table 2. WCTA Calculation Analysis (Z-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X1	X1	X1
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	-0,663	-0,548	0,327
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	0,704	-0,651	-1,630
3	PT ASTRA GRAPHIA TBK	ASGR	3,175	3,205	3,320
4	PT AVIANA SINAR ABADI TBK	IRSX	4,279	5,929	6,046
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	1,632	0,313	-0,336
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,857	1,480	1,081
7	PT DCI INDONESIA TBK	DCII	-0,369	-0,053	0,310
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	-1,237	-5,596	-18,541
9	PT ERA DIGITAL MEDIA TBK	AWAN	3,640	3,554	3,222
10	PT GALVA TECHNOLOGIES TBK	GLVA	1,934	2,061	2,342
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	5,769	3,975	1,881
12	PT INDOINTERNET TBK	EDGE	1,428	0,891	-0,236
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	1,423	1,605	1,712
14	PT ITSEC ASIA TBK	CYBR	-4,060	-4,109	3,635
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	1,710	1,506	4,544
16	PT METRODATA ELECTRONICS TBK	MTDL	2,970	2,957	2,887
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,588	0,744	-0,148
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	2,296	2,780	3,036
19	PT TECHNO9 INDONESIA TBK	NINE	1,830	4,454	2,947
20		TRON	2,248	2,502	3,481

	PT TEKNOLOGI KARYA DIGITAL NUSA TBK				
21	PT WIR ASIA TBK	WIRG	0,975	2,383	1,519
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	4,893	4,014	2,800
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,089	1,366	2,973
24	PT TERA DATA INDONUSA TBK	AXIO	0,982	1,800	2,019
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	3,456	1,771	2,782

Source: IDX data processed results, 2024

The table of working capital to total assets above, shows that from 2021 to 2023 there is 1 company that has experienced a negative ratio for 3 consecutive years, namely ENVY. Meanwhile, 24 other companies are in a volatile condition.

2. Analysis of the Calculation Retained earnings to total assets

Retained earnings to total assets (RETA) is an X2 variable in the Altman Z-Score method, this ratio is applied to see how capable the company's total assets are in creating retained earnings. Following the results of the calculation retained earnings to total assets for 25 technology sector companies:

Table 3. RETA Calculation Analysis (Z-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X2	X2	X2
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	-0,603	-0,519	-0,259
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	-2,864	-7,627	-9,172
3	PT ASTRA GRAPHIA TBK	ASGR	1,756	1,821	1,937
4	PT AVIANA SINAR ABADI TBK	IRSX	2,067	0,352	0,111
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	-1,229	-0,972	-1,355
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,426	0,225	0,261
7	PT DCI INDONESIA TBK	DCII	0,574	0,906	1,249
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	-14,702	-30,991	-77,434
9	PT ERA DIGITAL MEDIA TBK	AWAN	2,043	0,393	0,120

10	PT GALVA TECHNOLOGIES TBK	GLVA	0,539	0,601	0,766
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	0,010	0,118	-0,135
12	PT INDOINTERNET TBK	EDGE	1,103	1,225	1,033
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,485	0,128	0,132
14	PT ITSEC ASIA TBK	CYBR	-1,210	-0,507	-0,691
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	1,742	0,384	0,202
16	PT METRODATA ELECTRONICS TBK	MTDL	0,982	1,040	1,031
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,535	0,607	0,409
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	0,083	0,130	0,166
19	PT TECHNO9 INDONESIA TBK	NINE	-0,357	-0,020	-0,320
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	0,660	0,719	0,488
21	PT WIR ASIA TBK	WIRG	0,388	0,267	0,409
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	0,243	0,443	0,453
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,413	0,671	0,692
24	PT TERA DATA INDONUSA TBK	AXIO	0,545	0,476	0,682
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	1,140	0,762	1,237

Source: IDX data processed results, 2024

The table of Retained earnings to total assets above, shows that from 2021 to 2023 there are 6 companies that have experienced a negative ratio for 3 consecutive years, namely ATIC, DIGI, CASH, ENVY, ITSEC, NINE. Meanwhile, 24 other companies are in a volatile condition.

3. Analysis of the Calculation Earnings Before Interest and Taxes to Total Assets

Earnings before interest and taxes to total assets is the X3 variable in the Altman Z-Score method, this ratio is applied to estimate how capable the company's total assets are in creating net profit before deducting interest and tax expenses. The following is table 4 of the calculation results earnings before interest and taxes to total asset against 25 companies in the technology sector:

Table 4. EBTITA Calculation Analysis (Z-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X3	X3	X3
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	-0,255	0,529	0,779
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	-2,620	-5,489	-0,932
3	PT ASTRA GRAPHIA TBK	ASGR	0,283	0,324	0,521
4	PT AVIANA SINAR ABADI TBK	IRSX	0,700	0,414	-0,105
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	-0,374	-0,252	-1,040
6	PT DATA SINERGITAMA JAYA TBK	ELIT	1,123	0,714	0,655
7	PT DCI INDONESIA TBK	DCII	0,746	1,105	1,264
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	-25,286	-6,352	-13,451
9	PT ERA DIGITAL MEDIA TBK	AWAN	4,385	2,593	0,121
10	PT GALVA TECHNOLOGIES TBK	GLVA	0,558	1,057	0,952
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	-1,307	0,400	-0,424
12	PT INDOINTERNET TBK	EDGE	0,845	0,995	0,800
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,822	0,855	0,112
14	PT ITSEC ASIA TBK	CYBR	-0,399	-0,351	-1,228
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	0,702	0,513	0,201
16	PT METRODATA ELECTRONICS TBK	MTDL	0,871	0,902	0,829
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,662	1,584	0,669
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	0,001	0,157	0,017
19	PT TECHNO9 INDONESIA TBK	NINE	0,320	0,356	-0,736
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	1,102	1,615	0,702
21	PT WIR ASIA TBK	WIRG	0,848	0,537	0,596

22	PT WIRA GLOBAL SOLUSI TBK	WGSH	0,593	0,609	0,596
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	1,474	1,580	1,057
24	PT TERA DATA INDONUSA TBK	AXIO	1,798	0,831	1,258
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	2,192	1,021	0,958

Source: IDX data processed results, 2024

The table of earnings before interest and taxes to total assets above, shows that from 2021 to 2023 there are 4 companies that have experienced a minus ratio for 3 consecutive years, namely DIGI, CASH, ENVY, CYBR. Meanwhile, the other 21 companies are still classified as capable of generating profit before interest and taxes from their assets even though they fluctuate every year.

4. Analysis of the Calculation Book value of equity to book value of total debt

Book value of equity to book value of total debt is a variable X4 in the Altman Z-Score method, this ratio is applied to estimate how capable the book value of equity is in covering the overall book value of liabilities. This ratio shows how much a company's assets can depreciate, before the company's liabilities exceed equity and the company becomes bankrupt (Altman, 1968). In calculating this ratio, book value equity is the combined market value of the company's shares, while the book value of total debt includes current liabilities and long-term liabilities (Septiana, 2019). The following is table 5 of the results of the calculation of the book value of equity to book value of liabilities for 25 companies in the technology sector:

Table 5. BVEBVTD Calculation Analysis (Z-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X4	X4	X4
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	0,060	0,060	0,048
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	1,710	1,374	1,272
3	PT ASTRA GRAPHIA TBK	ASGR	0,138	0,144	0,159
4	PT AVIANA SINAR ABADI TBK	IRSX	1,060	9,879	19,914
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	0,362	0,440	0,241
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,444	0,618	0,494
7	PT DCI INDONESIA TBK	DCII	0,176	0,192	0,213
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	4,273	4,039	3,296
9	PT ERA DIGITAL MEDIA TBK	AWAN	0,026	7,305	5,638

10	PT GALVA TECHNOLOGIES TBK	GLVA	0,202	0,135	0,146
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	2,603	0,266	0,121
12	PT INDOINTERNET TBK	EDGE	0,089	0,054	0,017
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,117	0,339	0,443
14	PT ITSEC ASIA TBK	CYBR	0,023	0,013	1,483
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	0,591	6,395	4,341
16	PT METRODATA ELECTRONICS TBK	MTDL	0,035	0,031	0,025
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,097	0,104	0,082
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	2,517	1,959	1,977
19	PT TECHNO9 INDONESIA TBK	NINE	4,259	4,671	7,790
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	0,667	1,987	1,721
21	PT WIR ASIA TBK	WIRG	0,446	0,242	0,152
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	8,857	15,571	11,236
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,076	0,136	0,156
24	PT TERA DATA INDONUSA TBK	AXIO	0,183	0,258	0,378
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	0,451	0,080	0,174

Source: IDX data processed results, 2024

The table Book value of equity to book value of total debt above, shows that from 2021 to 2023 there are 14 companies that have experienced ratios below 100% for 3 consecutive years, namely ATIC, ASGR, CASH, ELIT, DCII, GLVA, EDGE, JATI, MTDL, MLPT, WIRG, CHIP, AXIO, ZYRX. Meanwhile, the other 11 companies are in a volatile condition and are classified as good in terms of the company's ability to pay its obligations.

5. Results of Altman Z-Score Method Analysis

After calculating the required variables, the next step is to apply the Altman Z-Score formula to determine the category financial distress in 25 technology sector companies that were used as research samples. The following is a table of the results of the analysis of the Altman Z-Score method:

Table 6. Calculation Analysis (Z-Score)

No	IDX Code	2021	2022	2023	2021	2022	2023	Company Type
		Z-Score	Z-Score	Z-Score	Category	Category	Category	
1	ATIC	-1,462	-0,478	0,895	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
2	DIGI	-3,070	-12,394	-10,463	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
3	ASGR	5,352	5,495	5,938	Healthy	Healthy	Healthy	Non-Manufacturing
4	IRSX	8,106	16,574	25,966	Healthy	Healthy	Healthy	Non-Manufacturing
5	CASH	0,391	-0,470	-2,491	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
6	ELIT	2,850	3,037	2,491	Healthy	Healthy	Prone	Non-Manufacturing
7	DCII	1,127	2,150	3,036	Prone	Prone	Healthy	Non-Manufacturing
8	ENVY	-36,953	-38,900	-106,130	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
9	AWAN	10,094	13,845	9,101	Healthy	Healthy	Healthy	Non-Manufacturing
10	GLVA	3,233	3,854	4,206	Healthy	Healthy	Healthy	Non-Manufacturing
11	RUNS	7,074	4,759	1,443	Healthy	Healthy	Prone	Non-Manufacturing
12	EDGE	3,465	3,165	1,615	Healthy	Healthy	Prone	Non-Manufacturing
13	JATI	2,847	2,928	2,399	Healthy	Healthy	Prone	Non-Manufacturing
14	CYBR	-5,645	-4,954	3,199	Potential for Bankruptcy	Potential for Bankruptcy	Healthy	Non-Manufacturing
15	MENN	4,744	8,799	9,289	Healthy	Healthy	Healthy	Non-Manufacturing
16	MTDL	4,858	4,929	4,772	Healthy	Healthy	Healthy	Non-Manufacturing
17	MLPT	1,882	3,039	1,012	Prone	Healthy	Potential for Bankruptcy	Non-Manufacturing
18	LUCK	4,898	5,025	5,197	Healthy	Healthy	Healthy	Non-Manufacturing
19	NINE	6,051	9,460	9,680	Healthy	Healthy	Healthy	Non-Manufacturing
20	TRON	4,677	6,824	6,392	Healthy	Healthy	Healthy	Non-Manufacturing
21	WIRG	2,658	3,429	2,676	Healthy	Healthy	Healthy	Non-Manufacturing
22	WGSH	14,586	20,637	15,084	Healthy	Healthy	Healthy	Non-Manufacturing
23	CHIP	2,052	3,753	4,879	Prone	Healthy	Healthy	Manufacturing
24	AXIO	3,508	3,366	4,336	Healthy	Healthy	Healthy	Manufacturing
25	ZYRX	7,240	3,634	5,151	Healthy	Healthy	Healthy	Manufacturing

Source: IDX data processed results, 2024

Based on table 6, if the Z value < 1.1, it indicates that the company has the potential for bankruptcy or financial distress. If the value range is 1.1 < Z < 2.6, it indicates that the company is in a vulnerable condition or gray area. If the Z value > 2.6, it indicates that the company is in a stable or healthy condition.

The results of the analysis of the Altman Z-Score method show that there are 4 technology sector companies that have the potential to experience bankruptcy for 3 consecutive years, including ATIC, DIGI, CASH, ENVY and 1 company experiencing financial distress, namely CYBR during 2021-2022. Meanwhile, as many as 7 companies are categorized as vulnerable/gray areas in several year. Meanwhile, the other 13 companies are in stable or healthy condition.

Springate S-Score Method

The Springate S-Score method which is a measure of financial distress/bankruptcy prediction by ratio in financial statement. These ratios include working capital to total assets, earnings before interest and taxes to total assets, earning before taxes to current liabilities, sales to total assets.

1. Analysis of the Calculation Working Capital to Total Assets

Working capital to total assets (WCTA) is the X1 variable in the Springate method, this ratio is applied to determine the amount of working capital formed from the total assets owned by the company. This ratio can be seen in the table of working capital to total assets.

Table 7. WCTA Calculation Analysis (S-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X1	X1	X1
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	-0,104	-0,086	0,051
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	0,111	-0,102	-0,256
3	PT ASTRA GRAPHIA TBK	ASGR	0,498	0,503	0,521
4	PT AVIANA SINAR ABADI TBK	IRSX	0,672	0,931	0,949
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	0,256	0,049	-0,053
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,135	0,232	0,170
7	PT DCI INDONESIA TBK	DCII	-0,058	-0,008	0,049
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	-0,194	-0,879	-2,911
9	PT ERA DIGITAL MEDIA TBK	AWAN	0,572	0,558	0,506
10	PT GALVA TECHNOLOGIES TBK	GLVA	0,304	0,324	0,368
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	0,906	0,624	0,295
12	PT INDOINTERNET TBK	EDGE	0,224	0,140	-0,037

13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,223	0,252	0,269
14	PT ITSEC ASIA TBK	CYBR	-0,637	-0,645	0,571
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	0,268	0,236	0,714
16	PT METRODATA ELECTRONICS TBK	MTDL	0,466	0,464	0,453
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,092	0,117	-0,023
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	0,361	0,436	0,477
19	PT TECHNO9 INDONESIA TBK	NINE	0,287	0,699	0,463
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	0,353	0,393	0,547
21	PT WIR ASIA TBK	WIRG	0,153	0,374	0,238
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	0,768	0,630	0,440
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,014	0,214	0,467
24	PT TERA DATA INDONUSA TBK	AXIO	0,154	0,283	0,317
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	0,543	0,278	0,437

Source: IDX data processed results, 2024

The table of working capital to total assets above, shows that from 2021 to 2023 there is 1 company that has experienced a negative ratio for 3 consecutive years, namely ENVY. Meanwhile, 24 other companies are in a volatile condition.

2. Analysis of the Calculation Earnings Before Interest and Taxes to Total Assets

Earnings before interest and taxes to total assets is an X2 variable in the Springate method, this ratio is applied to estimate how capable the company's total assets are in creating net profit before deducting interest and tax expenses. This ratio can be seen in the table earnings before interest and taxes to total assets.

Table 8. EBITTA Calculation Analysis (S-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X2	X2	X2
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	-0,117	0,242	0,356
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	-1,197	-2,508	-0,426
3	PT ASTRA GRAPHIA TBK	ASGR	0,129	0,148	0,238

4	PT AVIANA SINAR ABADI TBK	IRSX	0,320	0,189	-0,048
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	-0,171	-0,115	-0,475
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,513	0,326	0,299
7	PT DCI INDONESIA TBK	DCII	0,341	0,505	0,577
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	-11,552	-2,902	-6,145
9	PT ERA DIGITAL MEDIA TBK	AWAN	2,003	1,185	0,055
10	PT GALVA TECHNOLOGIES TBK	GLVA	0,255	0,483	0,435
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	-0,597	0,183	-0,194
12	PT INDOINTERNET TBK	EDGE	0,386	0,454	0,366
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,376	0,391	0,051
14	PT ITSEC ASIA TBK	CYBR	-0,182	-0,160	-0,561
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	0,320	0,234	0,092
16	PT METRODATA ELECTRONICS TBK	MTDL	0,398	0,412	0,379
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,303	0,724	0,306
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	0,001	0,072	0,008
19	PT TECHNO9 INDONESIA TBK	NINE	0,146	0,162	-0,336
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	0,503	0,738	0,321
21	PT WIR ASIA TBK	WIRG	0,388	0,245	0,272
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	0,271	0,278	0,272
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,673	0,722	0,483
24	PT TERA DATA INDONUSA TBK	AXIO	0,821	0,380	0,575

25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	1,001	0,466	0,438

Source: IDX data processed results, 2024

The table of earnings before interest and taxes to total assets above, shows that from 2021 to 2023 there are 4 companies that have experienced a minus ratio for 3 consecutive years, namely DIGI, CASH, ENVY, CYBR. Meanwhile, the other 21 companies are still classified as capable of generating profit before interest and taxes from their assets even though they fluctuate every year.

3. Analysis of the Calculation Earnings before taxes to current liabilities

Earnings before taxes to current liabilities is the X3 variable in the Springate method, this ratio is applied to compare net profit before tax to the company's current liabilities. The following is a table of the results of the calculation of earnings before taxes to current liabilities for 25 companies in the technology sector:

Table 9. EBTCL Calculation Analysis (S-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X3	X3	X3
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	-0,032	0,048	0,081
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	-1,969	-1,351	-0,151
3	PT ASTRA GRAPHIA TBK	ASGR	0,078	0,093	0,166
4	PT AVIANA SINAR ABADI TBK	IRSX	0,619	0,509	-0,544
5	PT CASHLEZ WORLDWIDE INDONESIA TBK	CASH	-0,118	-0,160	-0,345
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,243	0,193	0,182
7	PT DCI INDONESIA TBK	DCII	0,471	0,628	0,755
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	-3,891	-0,478	-0,356
9	PT ERA DIGITAL MEDIA TBK	AWAN	3,322	2,770	0,333
10	PT GALVA TECHNOLOGIES TBK	GLVA	0,088	0,142	0,132
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	-6,135	1,283	-0,522
12	PT INDOINTERNET TBK	EDGE	0,483	0,483	0,314
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,117	0,142	0,018
14	PT ITSEC ASIA TBK	CYBR	-0,029	-0,031	-0,448
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	0,231	0,409	0,264

16	PT METRODATA ELECTRONICS TBK	MTDL	0,184	0,187	0,166
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,101	0,237	0,093
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	0,001	0,078	0,007
19	PT TECHNO9 INDONESIA TBK	NINE	0,107	0,414	-1,420
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	0,250	0,617	1,045
21	PT WIR ASIA TBK	WIRG	0,213	0,213	0,185
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	1,591	3,519	2,562
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,219	0,318	0,328
24	PT TERA DATA INDONUSA TBK	AXIO	0,291	0,137	0,286
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	1,001	0,155	0,192

Source: IDX data processed results, 2024

The table of earning before taxes to current liabilities above, shows that from 2021 to 2023 there are 4 companies that have experienced a minus ratio for 3 consecutive years, namely DIGI, CASH, ENVY, CYBR. Meanwhile, 21 other companies are still classified as capable of generating pre-tax profit from their assets even though they fluctuate every year.

4. Analysis of the Calculation Sales to total assets

Sales to total assets is the X4 variable in the Springate method, this ratio is applied to measure how capable the company's total assets are in driving the sales chart. The following is a table of calculation results sales to total assets against 25 companies in the technology sector:

Table 10. STA Calculation Analysis (S-Score)

No.	Company Name	IDX Code	2021	2022	2023
			X4	X4	X4
1	PT ANABATIC TECHNOLOGIES TBK	ATIC	0,628	0,741	0,751
2	PT ARKADIA DIGITAL MEDIA TBK	DIGI	0,523	0,796	1,230
3	PT ASTRA GRAPHIA TBK	ASGR	0,497	0,435	0,443
4	PT AVIANA SINAR ABADI TBK	IRSX	0,485	0,868	0,592
5		CASH	0,364	0,229	0,339

	PT CASHLEZ WORLDWIDE INDONESIA TBK				
6	PT DATA SINERGITAMA JAYA TBK	ELIT	0,722	0,597	0,561
7	PT DCI INDONESIA TBK	DCII	0,116	0,130	0,142
8	PT ENVY TECHNOLOGIES INDONESIA TBK	ENVY	0,002	0,022	0,065
9	PT ERA DIGITAL MEDIA TBK	AWAN	0,639	0,442	0,130
10	PT GALVA TECHNOLOGIES TBK	GLVA	1,130	1,011	0,885
11	PT GLOBAL SUKSES SOLUSI TBK	RUNS	0,028	0,144	0,115
12	PT INDOINTERNET TBK	EDGE	0,195	0,205	0,140
13	PT INFORMASI TEKNOLOGI INDONESIA TBK	JATI	0,967	0,786	0,594
14	PT ITSEC ASIA TBK	CYBR	0,647	0,440	0,398
15	PT MENN TEKNOLOGI INDONESIA TBK	MENN	0,270	0,173	0,061
16	PT METRODATA ELECTRONICS TBK	MTDL	0,975	0,978	0,871
17	PT MULTIPOLAR TECHNOLOGY TBK	MLPT	0,400	0,506	0,423
18	PT SENTRAL MITRA INFORMATIKA TBK	LUCK	0,248	0,312	0,244
19	PT TECHNO9 INDONESIA TBK	NINE	0,135	0,157	0,133
20	PT TEKNOLOGI KARYA DIGITAL NUSA TBK	TRON	0,350	0,502	0,303
21	PT WIR ASIA TBK	WIRG	0,931	0,766	0,885
22	PT WIRA GLOBAL SOLUSI TBK	WGSH	0,162	0,187	0,228
23	PT PELITA TEKNOLOGI GLOBAL TBK	CHIP	0,759	0,883	1,148
24	PT TERA DATA INDONUSA TBK	AXIO	0,835	0,547	0,541
25	PT ZYREXINDO MANDIRI BUANA TBK	ZYRX	0,938	0,436	0,236

Source: IDX data processed results, 2024

According to the industry standard for the total asset turnover ratio is twice the asset turnover in one year (Kasmir, 2014). The table above shows that from 2021 to 2023 it is

still classified below the industry standard, thus the company's ability to drive the sales chart of the total assets owned is relatively low and fluctuating every year.

5. Results of Springate S-Score Method Analysis

After calculating the required variables, the next step is to apply the Springate formula to determine the category of financial distress in 25 technology sector companies that are used as research samples. The following is a table of the results of the analysis of the Springate method:

Table 11. Calculation Analysis (S-Score)

No	IDX Code	2021	2022	2023	2021	2022	2023	Company Type
		S-Score	S-Score	S-Score	Category	Category	Category	
1	ATIC	0,376	0,945	1,239	Potential for Bankruptcy	Healthy	Healthy	Non-Manufacturing
2	DIGI	-2,532	-3,165	0,398	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
3	ASGR	1,203	1,179	1,367	Healthy	Healthy	Healthy	Non-Manufacturing
4	IRSX	2,095	2,497	0,949	Healthy	Healthy	Healthy	Non-Manufacturing
5	CASH	0,331	0,003	-0,534	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
6	ELIT	1,612	1,348	1,213	Healthy	Healthy	Healthy	Non-Manufacturing
7	DCII	0,870	1,255	1,523	Healthy	Healthy	Healthy	Non-Manufacturing
8	ENVY	-15,636	-4,236	-9,348	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
9	AWAN	6,536	4,955	1,024	Healthy	Healthy	Healthy	Non-Manufacturing
10	GLVA	1,777	1,960	1,820	Healthy	Healthy	Healthy	Non-Manufacturing
11	RUNS	-5,798	2,233	-0,305	Potential for Bankruptcy	Healthy	Potential for Bankruptcy	Non-Manufacturing
12	EDGE	1,289	1,282	0,782	Healthy	Healthy	Potential for Bankruptcy	Non-Manufacturing
13	JATI	1,683	1,571	0,932	Healthy	Healthy	Healthy	Non-Manufacturing
14	CYBR	-0,201	-0,397	-0,040	Potential for Bankruptcy	Potential for Bankruptcy	Potential for Bankruptcy	Non-Manufacturing
15	MENN	1,091	1,053	1,130	Healthy	Healthy	Healthy	Non-Manufacturing
16	MTDL	2,023	2,041	1,869	Healthy	Healthy	Healthy	Non-Manufacturing
17	MLPT	0,897	1,584	0,798	Healthy	Healthy	Potential for Bankruptcy	Non-Manufacturing
18	LUCK	0,610	0,898	0,735		Healthy		

					Potential for Bankruptcy		Potential for Bankruptcy	Non-Manufacturing
19	NINE	0,675	1,433	-1,161	Potential for Bankruptcy	Healthy	Potential for Bankruptcy	Non-Manufacturing
20	TRON	1,456	2,249	2,215	Healthy	Healthy	Healthy	Non-Manufacturing
21	WIRG	1,684	1,599	1,581	Healthy	Healthy	Healthy	Non-Manufacturing
22	WGSH	2,792	4,615	3,502	Healthy	Healthy	Healthy	Non-Manufacturing
23	CHIP	1,666	2,137	2,426	Healthy	Healthy	Healthy	Manufacturing
24	AXIO	2,101	1,346	1,720	Healthy	Healthy	Healthy	Manufacturing
25	ZYRX	3,483	1,335	1,303	Healthy	Healthy	Healthy	Manufacturing

Source: IDX data processed results, 2024

Based on table 11, the classification of company conditions is assessed based on the results of the S-Score, if the S value < 0.862, it indicates that the company has the potential for bankruptcy or financial distress. If the S value > 0.862, it indicates that the company is in a stable or healthy state.

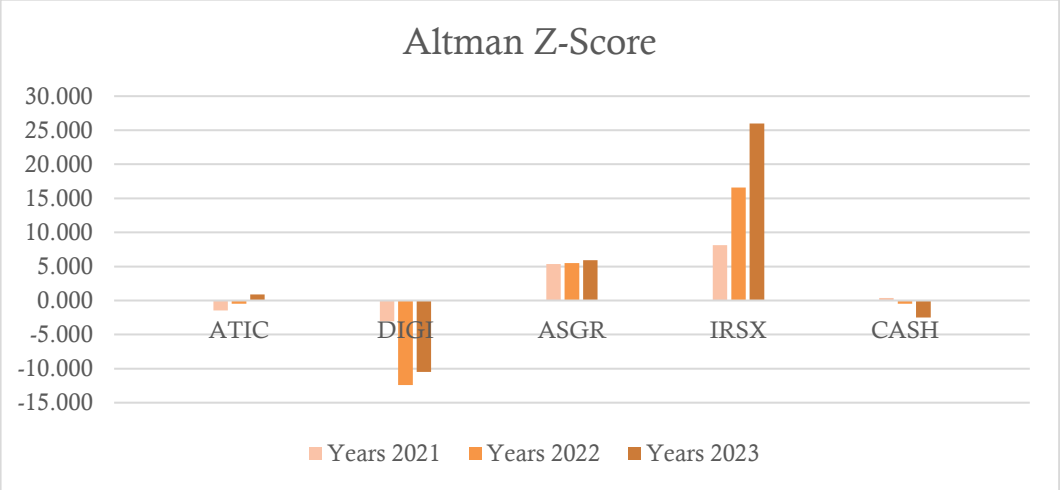
The results of the analysis of the Springate method show that there are 4 companies that have the potential to go bankrupt for 3 consecutive years, including: DIGI, CASH, ENVY, CYBR. Meanwhile, 6 other companies experienced financial distress in several year. Meanwhile, 15 other companies are in good health for 3 consecutive years.

DISCUSSION

From the results of the research conducted regarding the comparison of predictions of potential bankruptcy conditions using the Altman Z-Score and Springate S-Score methods for the technology sector for the 2021-2023 period. It can be described as follows:

1. Altman Z-Score Modification Method

The following is a description of the results of the research using the Altman Z-Score method based on the graph of each company.



Source: IDX data processed results, 2024

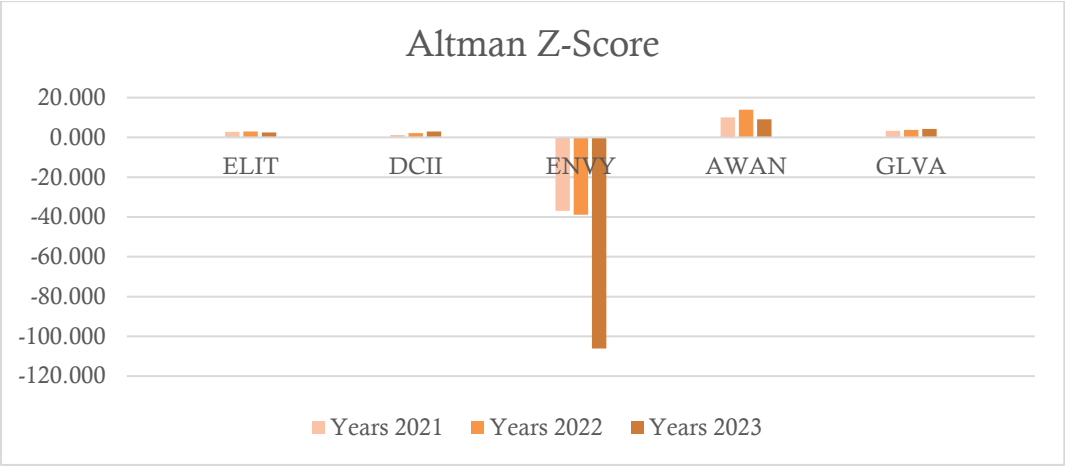
Figure 2. Z-Score Chart of ATIC, DIGI, ASGR, IRSX, CASH

Based on the graph image above, ATIC companies in 2021 are below 0 which shows a Z-Score value of minus, precisely -1,462 so it has the potential to go bankrupt. This is due to the WCTA ratio of -0,663, the RETA ratio of -0,603 and the EBITTA ratio of -0,255. In the following year, the Z-Score was below 0 with a value of -0,478 which has the potential to go bankrupt. In 2023, the Z-Score value has increased slightly with a value of 0,895, which still has the potential to go bankrupt.

DIGI in 2021 showed a Z-Score of -3,070 and in the following year it worsened to touch -12,394 due to a drastic decline in the WCTA ratio, RETA ratio and EBITTA ratio. Similarly, in 2023, the Z-Score value touched -10,463, slightly better than before even though it still has the potential to go bankrupt.

ASGR companies are in a healthy condition based on the Z-Score obtained of 5,352 in 2021 and have increased every year, namely 5,495 in 2022 and 5,938 in 2023. Similarly, IRSX companies over the last 3 years have been in a healthy condition based on Z-Score values of 8,106 in 2021 and 16,574 in 2022 and 25,966 in 2023. The health of the two companies continues to improve every year based on the graphic image above.

Companies with the IDX code (CASH) in 2021 showed a Z-Score value of 0,391 and in the following year decreased by -0,470 due to a decrease in the WCTA ratio. Similarly, in 2023, the Z-Score value has decreased again to touch -2,491 which has the potential to experience bankruptcy.



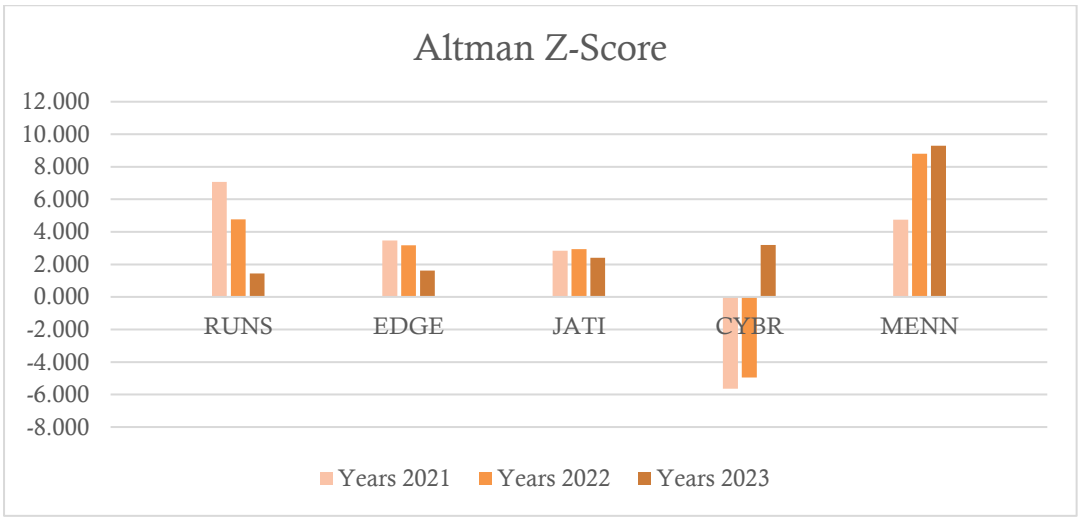
Source: IDX data processed results, 2024

Figure 3. Z-Score Charts of ELIT, DCII, ENVY, AWAN, GLVA

Based on figure 3 above, ELIT companies in 2021 show a Z-Score value of 2,850 which is included in the healthy category. Similarly, in 2022 the Z-Score value. In 2023, the Z-Score value has increased slightly with a value of 0,895, which still has the potential to go bankrupt. DCII companies in 2021, show a Z-Score value of 1,127 which puts the company in the vulnerable/vulnerable category. However, the company's financial condition has increased in 2022 with a Z-Score of 2,150. This increase continued the following year to "Healthy" in 2023 with a value of 3,036. This shows that DCII companies have succeeded in improving their financial stability.

ENVY companies have been in poor condition for 3 consecutive years, with a Z-Score value touching negative, which is -36,953 in 2021 and continues to decline to -106,130 in 2023. The company continues to be in the "Potentially Bankrupt" category, indicating that there are very serious financial problems that have not been successfully addressed.

AWAN companies have shown very stable and healthy conditions for 3 consecutive years, with a very high Z-Score value from 10,094 in 2021 to 13,845 in 2022, although it decreased slightly to 9,101 in 2023. The company is consistently in the "Healthy" category, signaling its ability to maintain its financial condition. GLVA is in a healthy financial condition with a Z-Score that continues to increase annually from 3,233 in 2021 to 4,206 in 2023. GLVA was in the "Healthy" category for 3 periods, showing good stability in its financial operations.



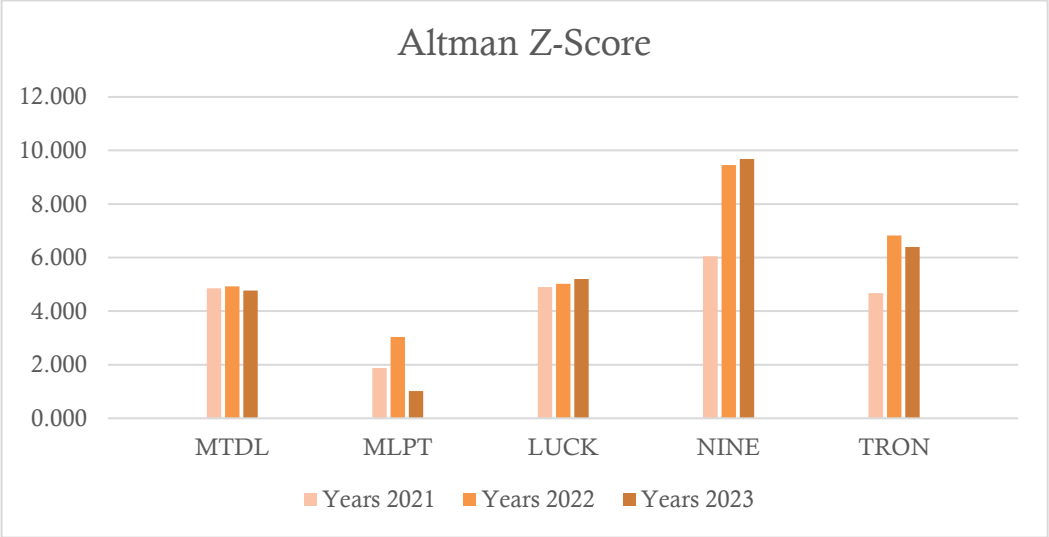
Source: IDX data processed results, 2024

Figure 4. Z-Score Charts RUNS, EDGE, JATI, CYBR, MENN

Based on figure 4 above, the performance of the RUNS company has decreased every year. The company's Z-Score was quite high in 2021 at 7,074 and in 2022 at 4,759 then dropped drastically to 1,443 in 2023. This decline was due to an EBITTA ratio of -0,424 and a RETA ratio of -0,135 thus leading to a status change from "Healthy" to "Vulnerable," indicating that the company faces financial challenges that need to be addressed urgently to avoid worse conditions.

EDGE companies showed a slight decline in the Z-Score value from 3,465 in 2021 to 1,615 in 2023. The decline has resulted in those previously in the Healthy category becoming vulnerable/vulnerable in 2023. The condition of the JATI company based on figure 4 above shows a fluctuating Z-Score value from 2,847 in 2021 to 2,928 in 2022 and a decrease in 2023 of 2,399. Thus, the decline resulted in being included in the vulnerable/vulnerable category in 2023.

Based on figure 4 above, CYBR Company showed a major improvement in its financial condition, with the Z-Score increasing from -5,645 in 2021 to 3,199 in 2023. The company managed to get out of the "Potentially Bankrupt" category in 2021 and 2022, and finally entered the "Healthy" category in 2023. This shows that the company's recovery efforts have yielded results. The MENN company experienced an excellent graphical improvement in the results of the Z-Score calculation from 4,744 in 2021 to 9,289 in 2023. The company is consistently in the "Healthy" category, which indicates that the company's financial condition is getting stronger every year.



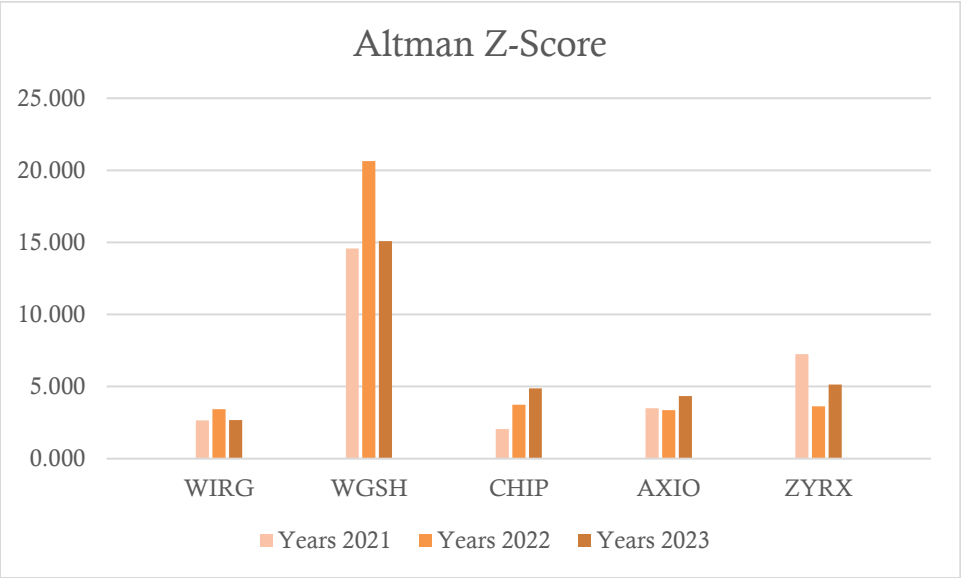
Source: IDX data processed results, 2024

Figure 5. Z-Score Charts of MTDL, MLPT, LUCK, NINE, TRON

MTDL companies show relatively stable financial performance with a relatively consistent Z-Score, from 4,858 in 2021 and slightly decreased in 2023 to 4,772. The company continues to be in the "Healthy" category, which indicates that the company's financial condition is still in the good category. MLPT companies have experienced fluctuations in their financial performance, with a Z-Score that increased from 1,882 in 2021 to 3,039 in 2022 but declined again to 1,012 in 2023. This decline resulted in a change in the company's status from "Healthy" in 2022 to potentially bankrupt in 2023. This is due to a decrease in the value of the WCTA ratio which touched -0,148 in 2023.

LUCK Company maintains excellent performance with a Z-Score that continues to improve every year. In 2021, the Z-Score value of 4,898 became 5,197 in 2023. The company is consistently in the Healthy category, which reflects strong financial stability and effective financial management. Likewise, NINE companies showed an increase in Z-Score from 6,051 in 2021 to 9,680 in 2023. The company continues to be in the Healthy category, showing continuous improvement in its financial condition, and strengthening its financial position year on year. TRON companies are performing well with a Z-Score

that increased from 4,677 in 2021 to 6,392 in 2023. The company has been consistent in the Healthy category for 3 consecutive years.



Source: IDX data processed results, 2024

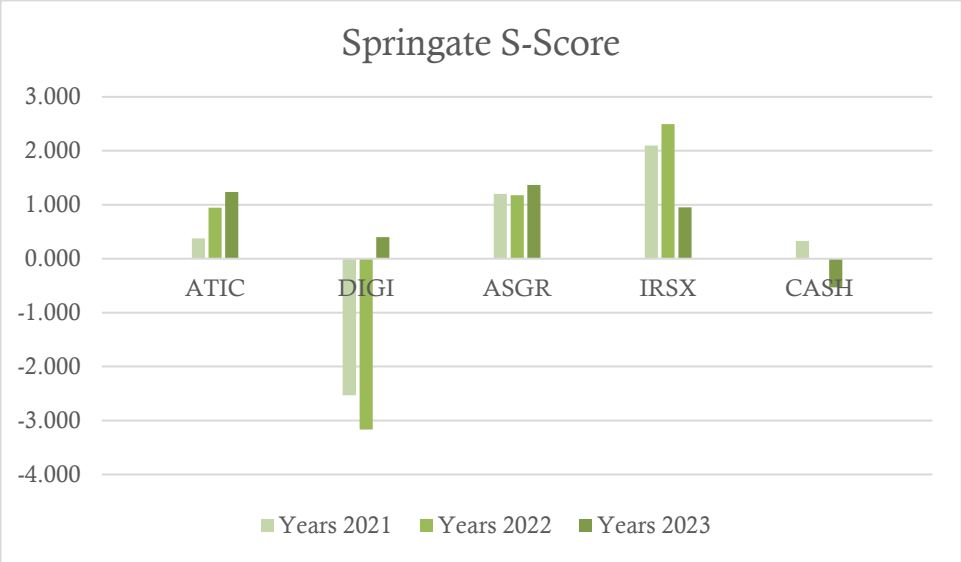
Figure 6. Z-Score Chart WIRG, WGSH, CHIP, AXIO, ZYRX

Based on figure 6 above, WIRG companies experienced fluctuations in Z-Score value from 2,658 in 2021 to 3,429 in 2022 and experienced a slight decrease to 2,676 in 2023. The company has continued to be in the healthy category for the past 3 years. WGSH shows relatively high financial performance in the technology sector with a Z-Score of 14,586 in 2021 and increased to 20,637 in 2022. The company is consistently in the "Healthy" category which indicates a relatively stable financial condition.

CHIP companies experienced an increase in Z-Score value from 2,052 in 2021 to 4,879 in 2023. This increase has caused companies that were initially in the vulnerable category to become healthy in 2022 and 2023. The AXIO company shows good stability with a Z-Score value of 3,508 in 2021 to 4,336 in 2023. The company is in the category of "Healthy for the last 3 years, which indicates that its financial condition is relatively stable. ZYRX companies experienced a decline in Z-Score from 7,240 in 2021 to 3,634 in 2022. Despite the decline, the company experienced an increase in its Z-Score value in the following year to 5,151. The company remains in the healthy category which shows that despite the pressure, ZYRX is still able to maintain its financial condition within safe limits.

2. Springate S-Score Method

The following is a description of the results of the research using the Altman Z-Score method based on the graph of each company.



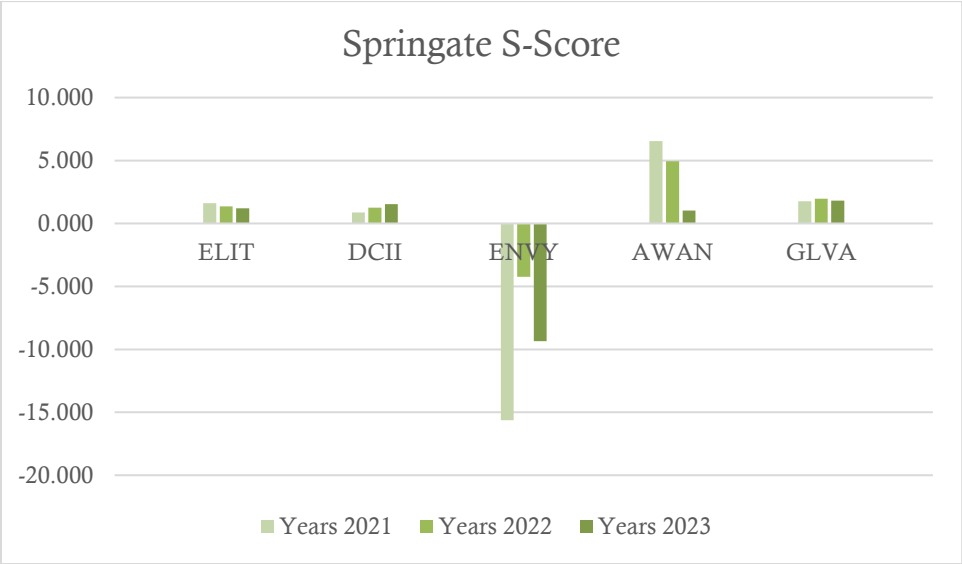
Source: IDX data processed results, 2024

Figure 7. S-Score Chart of ATIC, DIGI, ASGR, IRSX, CASH

Based on figure 7, ATIC companies have experienced a consistent improvement in their financial condition, with an S-Score value that continues to rise from 0,376 in 2021 to 1,239 in 2023. This improvement shows that the WCTA ratio, which two years earlier touched -0,104 and -0,086, became positive 0,051 in 2023. Likewise, the EBITTA ratio in 2021 touched -0,117 and increased in 2022 to 0,242 and 0,356 in 2023. The company managed to improve its financial health and changed from the "Potentially Bankrupt" category in 2021 to "Healthy" in 2022 and 2023.

DIGI companies are experiencing less stable financial conditions, with a negative S-Score of -2,532 in 2021 which further deteriorated to -3,165 in 2022, although it improved slightly in 2023 with an S-Score of 0,398. This increase occurred due to an increase in the STA ratio of 1,230 in 2023. However, the company remained in the "Potentially Bankrupt" category for three consecutive years. Next is the ASGR company that can maintain a relatively stable performance, with a positive S-Score above 1,0 for three consecutive years, so this company is in a healthy condition.

Based on figure 7 IRSX companies experienced volatile financial conditions, with an S-Score that peaked at 2,497 in 2022 and decreased slightly to 0,949 in 2023, but the company remained in the healthy category throughout the period. Next, CASH companies have experienced a decline for 3 consecutive years. Although the S-Score in 2021 and 2022 is still in positive territory, in 2023 the S-Score drops drastically to negative (-0,534), indicating the potential for bankruptcy that continues to increase every year. The negative S-Score was affected by a decrease in the EBTCL ratio of -0,345, the EBITTA ratio of -0,475 and the WCTA ratio of -0,053 in 2023.

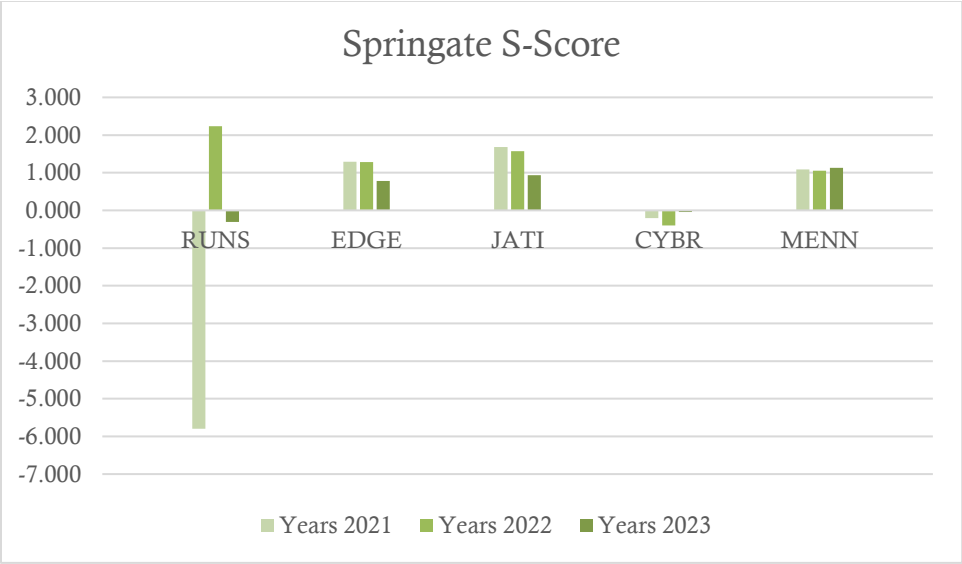


Source: IDX data processed results, 2024

Figure 8. S-Score Chart ELIT, DCII, ENVY, AWAN, GLVA

The ELIT company maintained a sound financial condition with a stable S-Score from 1,612 in 2021 to 1,213 in 2023, placing it in the "Healthy" category throughout the period. Next is the DCII company, which shows an increase in S-Score from 0,870 in 2021 to 1,523 in 2023, indicating that this company has managed to maintain a healthy condition. On the other hand, ENVY companies are experiencing a very poor financial situation with a negative S-Score, ranging from -15,636 in 2021 to -9,348 in 2023. This is closely related to the EBITTA ratio value which touched -11,552 in 2021, -2,902 in 2022 and -6,145 in 2023. So that this company remains in the "Potentially Bankrupt" category for three consecutive years.

Companies with the IDX code (AWAN) have experienced a decline in the last 3 years. The S-Score obtained in 2021 was 6,536 and in 2022 it became 4,955 and continued until it touched 1,024 in 2023. Despite this, the company remains in the "Healthy" category, although this downturn is worth watching. Next is GLVA companies that experience volatile conditions with an S-Score that remains in healthy territory, from 1,777 in 2021 and increased to 1,960 in 2022 and again decreased to 1,820 in 2023.



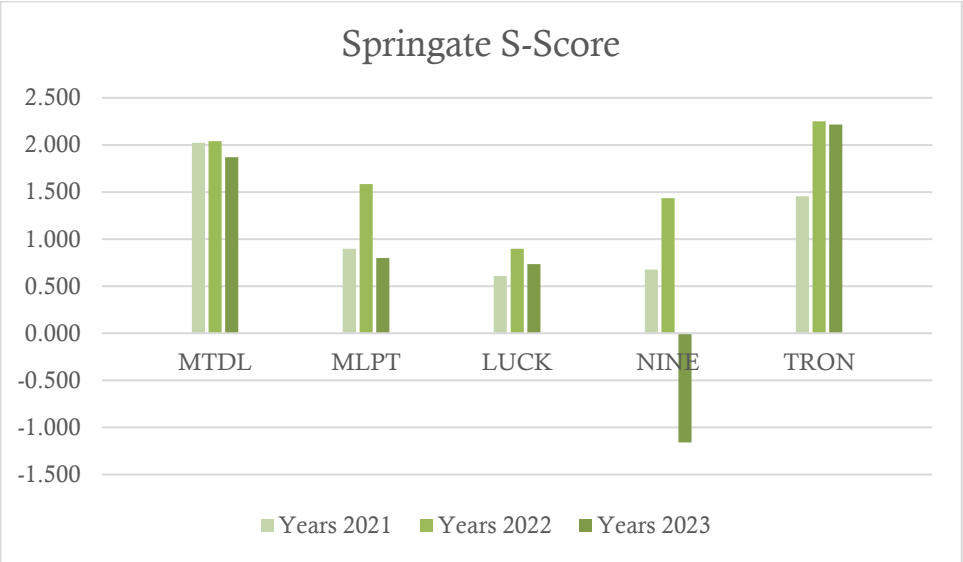
Source: IDX data processed results, 2024

Figure 9. S-Score Charts RUNS, EDGE, JATI, CYBR, MENN

Based on figure 9, RUNS companies experienced poor financial conditions in 2021 and 2023. With an S-Score of -5,798 in 2021 and -0,305 in 2023. The S-Score increased in 2022 to 2,233 due to the EBTCL ratio of 1,283 and the WCTA ratio of 0,624 in 2022. This shows that the company is in the "Potentially Bankrupt" category in 2021 and 2023.

EDGE companies experienced a decrease in S-Score value of 1,289 in 2021 to 0,782 in 2023, which puts companies in the "Healthy" category in 2021 and 2022 to potentially go bankrupt in 2023. Likewise, the JATI company experienced a decrease in S-Score from 1,683 in 2021 to 0,932 in 2023, but the company remained in a healthy condition.

CYBR companies are in an unstable condition with a negative S-Score from -0,201 in 2021 to -0,040 in 2023 and remain in the "Potentially Bankrupt" category. MENN companies show stable financial condition with an S-Score that slightly improved from 1,091 in 2021 to 1,130 in 2023, maintaining the company's position in the "Healthy" category.

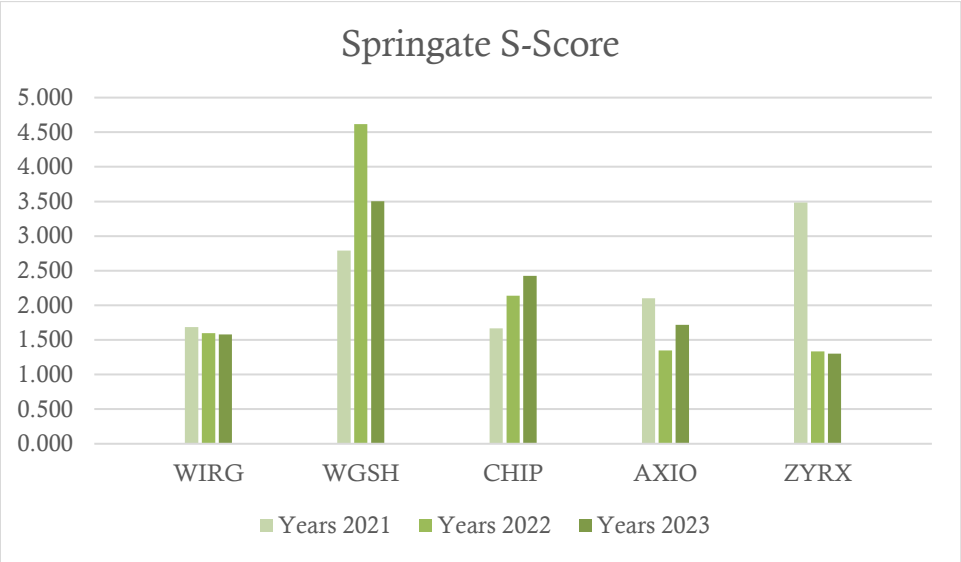


Source: IDX data processed results, 2024

Figure 10. S-Score Chart of MTDL, MLPT, LUCK, NINE, TRON

MTDL maintained financial stability with an S-Score of 2,023 in 2021 to 1,869 in 2023. The company for 3 consecutive years remained in the "Healthy" category. Next, MLPT companies showed a slight decrease in S-Score from 0,897 in 2021 to 0,798 in 2023. This causes the company to be included in the category of potential bankruptcy in 2023.

LUCK company experienced fluctuations in S-Score values. In 2021 the S-Score value was 0,610 in 2021 to 0,735 in 2023, making the company in the "Potentially Bankrupt" category in 2021 and 2023. Next, the NINE company also experienced a drastic decrease in its S-Score from 1,433 in 2022 to -1,161 in 2023, which caused the company to switch from "Healthy" in 2022 to "Potentially Bankrupt" in 2023. TRON companies showed good performance throughout 2021 to 2023 with an increase in S-Score from 1,456 in 2021 to 2,215 in 2023, placing it in the "Healthy" category for 3 consecutive years.



Source: IDX data processed results, 2024

Figure 11. S-Score Chart WIRG, WGSH, CHIP, AXIO, ZYRX

WIRG companies also show good financial stability with a slightly declining but healthy S-Score from 1,684 in 2021 and to 1,581 in 2023. WGSH stands out with an S-Score in the healthy category for 3 years, this shows the company's financial stability which is relatively good with an S-Score of 2,792 in 2021 to 3,502 in 2023, so that this company remains in the "Healthy" category. CHIP companies also show good financial condition with an increase in S-Score value every year from 1,666 in 2021, and continue to rise to 2,426 in 2023, the company has remained in the "Healthy" category for the past 3 years.

AXIO company experienced a decrease in S-Score from 2,101 in 2021 to 1,720 in 2023. Despite the decline, the company remained in the "Healthy" category throughout the period. Likewise, ZYRX companies experienced a decrease in S-Score starting from 3,483 in 2021 to 1,303 in 2023, although there was a slight decline in the company's condition is still in the healthy category.

3. Comparison of Accuracy and Type Error Levels

The following are the results of the comparison of accuracy levels based on the two methods of predicting the bankruptcy of companies used:

Table 12. Comparison of Accuracy Levels

No	Method	Period	Number of Correct Predictions	Number of samples	Accuracy Rate (%)	Average (%)
1	Altman Z-Score	2021	17	25	68%	69%
		2022	19	25	76%	
		2023	16	25	64%	
2	Springate S-Score	2021	17	25	68%	72%
		2022	21	25	84%	
		2023	16	25	64%	

Source: IDX data processed results, 2024

Altman Z-Score shows a relatively stable level of accuracy, but it tends to decline in 2023. However, the average accuracy obtained over three years is still quite good because it is above 60%, which is 69%. Meanwhile, Springate S-Score generally shows better accuracy than Altman Z-Score with an average accuracy of 72%. In 2022, Springate S-

Score achieved the highest accuracy rate of 84% in 2022, demonstrating its reliability in predicting bankruptcy for the period.

The following are the results of a comparison of types of errors based on the two methods of predicting the bankruptcy of companies used:

Table 13. Comparison of Type Errors

No	Method	Period	Number of Prediction Errors	Number of samples	*Type Error* (%)	Average (%)
1	Altman Z-Score	2021	8	25	32%	31%
		2022	6	25	24%	
		2023	9	25	36%	
2	Springate S-Score	2021	8	25	32%	28%
		2022	4	25	16%	
		2023	9	25	36%	

Source: IDX data processed results, 2024

The Altman Z-Score method has a higher average type error (31%) compared to the Springate S-Score (28%) with a case study of the technology sector listed on the Indonesia Stock Exchange. In 2022, the Springate S-Score method showed a lower type error (16%) with a total prediction error of 4 companies compared to Altman Z-Score which reached (24%) with a total prediction error of 6 companies.

CONCLUSION

Based on the results of the research and discussion that has been carried out, the researcher can draw the conclusion that:

1. The results of the analysis of the Altman Z-Score method show that there are 4 technology sector companies that have the potential to experience bankruptcy for 3 consecutive years, including ATIC, DIGI, CASH, ENVY and 1 company experiencing financial distress, namely CYBR during 2021-2022. Meanwhile, as many as 7 companies are categorized as vulnerable/gray areas in several years, including ELIT, DCII, RUNS, EDGE, JATI, MLPT, CHIP. Meanwhile, the other 13 companies are in stable or healthy condition.
2. The results of the analysis of the Springate S-Score method show that since the COVID-19 pandemic hit in Indonesia, technology sector companies listed on the IDX have indicated 4 companies that have the potential to go bankrupt for 3 consecutive years, including: DIGI, CASH, ENVY, CYBR. Meanwhile, 6 other companies experienced financial distress in several years, including ATIC, RUNS, EDGE, MLPT, LUCK, NINE. Meanwhile, 15 other companies are in good health even though the economic conditions are not friendly.
3. The results of a comparison of accuracy levels and types of errors obtained over three years in technology sector companies show that the Springate S-Score method produces more accurate accuracy with lower types of errors than the Altman Z-Score method.

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