Financial Distress Analysis Using Taffler Method on Cement Subsector Manufacturing Companies Listed on The Indonesia Stock Exchange

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Abstrak. This study aims to determine the potential for Financial Distress in the cement manufacturing industry listed on the Indonesia Stock Exchange as measured using the Taffler model discriminant analysis. The population of this study is the financial statements of 6 cement companies including PT. Semen Indonesia (Persero) Tbk, PT. Indocement Tunggal Prakarsa Tbk, PT. Solusi Bangun Indonesia Tbk, PT. Waskita Beton Precast Tbk, PT. Wijaya Karya Beton Tbk, PT. Semen Baturaja (Persero) Tbk. While the samples used are financial statements in the form of income statements and statements of financial position of PT. Waskita Beton Precast Tbk in 2020-2021 which shows continuous fluctualization conditions. Data collection techniques use documentation techniques with quantitative descriptive research types. The results of this study explain that PT. Waskita Beton Precast Tbk for the 2020-2021 period shows that in 2020 the company experienced a condition of Distress with a T-Score value of -0.05 below the cut off point value that has been set >0.3 declared in a healthy condition (safe). Meanwhile, in 2021 the company PT. Waskita Beton Precast Tbk is in Grey Area condition with a T-Score value of 0.23.

Keywords: Financial Distress, Taffler, PT. Waskita Beton Precast Tbk

INTRODUCTION

Globalization that occurs brings dynamic changes in almost all aspects of life, including the economic sphere in the business world. Competition in selling products in the market is not only seen in terms of quality, but it turns out that the selling price of products also greatly affects the number of units sold (Pranita & Kristanti, 2020). Price competition makes the company eventually sell with a profit margin that is not too large, while the company must still ensure that its financial obligations can be met. With the hope, it will generate increased profits every year to continue to grow and not experience liquidation (Wulandari, Burhanudin, & Widayanti, 2017). Financial difficulties are characterized when a company cannot meet a payment schedule or when cash flow projections indicate that the company will soon be unable to meet its obligations (Brigham and Daves in (Zatira & Puspitasari, 2020).

The cement industry is one of the pillars of economic development in Indonesia. Its position in creating sustainable development and infrastructure opportunities makes cement one of the backbones of the country's progress. Listed on the Indonesia Stock Exchange (IDX), there are at least 6 companies that dominate the domestic cement market. Namely PT. Semen Indonesia Tbk, PT. Indocement Tunggal Prakarsa Tbk, Pt. Solusi

Bangun Indonesia Tbk, PT. Waskita Beton Precast Tbk, PT. Wijaya Karya Beton Tbk, and PT. Semen Baturaja (Persero) Tbk.

Demand for cement commodities decreased national sales volume by 1,1% year-on-year (YoY) until September 2022, compared to cement demand until September 2021. This is because the cement subsector is faced with Oversupply conditions which are at the level of 57% below the normal level of around 70% which triggers competition between companies to be tighter. The gloomy cement industry in Indonesia is illustrated in the financial statements of companies listed on the Indonesia Stock Exchange (IDX). Then in early September 2021, the Indonesian cement industry experienced a case of predatory pricing or price slamming practices pioneered by foreign cement factories that have been operating in Indonesia.

The company sells its cement products cheaply in order to gain market share such as on online sites, where local cement must compete with imported cement which is sold cheaper. Prediction errors on the company's financial statements in the future can have fatal consequences, namely the inverstor will lose the shares that have been invested and creditors will also lose due to lending capital that cannot be paid back by the company (Olengga & Fauzi, 2020). To overcome this, lenders, investors, governments, accountants and even management must be able to identify indicators of financial distress which are signals from within the company that can indicate potential financial difficulties (Matahari, Akbar, & Anwar, 2022:4659).Bankruptcy prediction is important as an early warning that can change all complications and can avoid high costs incurred due to failure (Edi &; Tania, 2018: 80).

Table 1. Financial condition of Cement Subsector Companies Listed on the Exchange Indonesia Securities Period 2018-2021

Stock code	Year	Income Statement (Rp)	Percentage %	Income (Rp)	Percentage %	Total Assets (Rp)	Percentage %
SMGR	2018	3.517.374.000.000	-	30.687.626.000.000	-	50.783.836.000.000	-
	2019	2.268.151.000.000	-36%	40.368.107.000.000	32%	79.807.067.000.000	57%
	2020	2.317.236.000.000	2%	35.171.668.000.000	-13%	78.006.244.000.000	-2%
	2021	2.157.170.000.000	-7%	34.957.871.000.000	-1%	76.504.240.000.000	-2%
INTP	2018	1.241.944.000.000	-	15.190.283.000.000	-	27.788.562.000.000	-
	2019	1.883.349.000.000	52%	15.939.348.000.000	5%	27.707.749.000.000	0%
	2020	1.764.880.000.000	-6%	14.184.322.000.000	-11%	27.344.672.000.000	-1%
	2021	1.872.995.000.000	6%	14.771.906.000.000	4%	26.136.114.000.000	-4%
SMCB	2018	780.601.000.000	-	10.377.729.000.000	-	18.667.187.000.000	-
	2019	566.262.000.000	-27%	11.057.843.000.000	7%	19.567.498.000.000	5%
	2020	618.629.000.000	9%	10.108.220.000.000	-9%	20.738.125.000.000	6%
	2021	706.107.000.000	14%	11.218.181.000.000	11%	21.491.716.000.000	4%
WSBP	2018	1.315.904.712.927	-	8.000.149.423.527	-	15.222.388.589.814	-
	2019	803.844.617.906	-38,91%	7.467.175.916.375	-6,66%	16.149.121.684.330	6,09%
	2020	(4.345.005.600.305)	-640,53%	2.211.413.142.070	-70,38%	8.589.025.755.237	-46,81%
	2021	-1.904.425.883.849	-56,17%	1.380.071.332.830	-37,59%	6.882.077.282.159	-19,87%
WTON	2018	490.020.360.035	-	6.930.628.258.854	-	8.881.778.299.672	-
	2019	517.571.726.078	6%	7.083.384.467.587	2%	10.337.895.087.207	16%
	2020	120.990.297.330	-77%	4.803.359.291.718	-32%	8.509.017.299.594	-18%
	2021	82.944.688.133	-31%	4.312.853.243.803	-10%	8.928.183.492.920	5%
SMBR	2018	73.564.912.000	-	1.995.807.528.000	-	5.538.079.503.000	-
	2019	27.593.178.000	-62%	1.999.516.771.000	0%	5.571.270.204.000	1%
	2020	1.189.571.000	-96%	1.721.907.150.000	-14%	5.737.175.560.000	3%
	2021	58.355.914.000	4806%	1.751.585.770.000	2%	5.817.745.619.000	1%

Source: Financial Report of Cement Subsector Companies for 2018-2021. Data processed

Through percentage analysis of decline table 1. It is known that 1 in 6 cement subsector manufacturing companies listed on the Indonesia Stock Exchange for the 2018-2021 period shows that the performance of financial statements has decreased in terms of profits, revenue, and the company's ability to manage its assets. in 2021 the company that shows the lowest financial statement analysis is PT. Waskita Beton Precast. Where the achievement of profit decreased significantly by Rp. -1.904.425.883.849 or decreased by -56,17%. Revenue decreased by Rp. 1.380.071.332.830 or -37,56% and total assets. PT. Waskita Beton Precast. Tbk also experienced a decrease of Rp. 6.882.077.282.159 or -19,87%. While the company that obtained an increase in profit from the previous year was PT. Semen Baturaja (Persero). Tbk with a total of Rp 58.355.914.000 which means an increase of 4806% from the previous year. For revenue, the highest achievement was obtained by PT. Solusi Bangun Indonesia Tbk amounted to Rp. 11.218.181.000.000 or an increase of 11%. For the highest total asset achievement of cement subsector manufacturing companies, PT. Wijaya Karya Beton Tbk amounted to Rp. 8.928.183.492.920 or an increase of 5% from the previous year.

Table 2. The Company's Ability to Pay Liquidity at PT. Waskita Beton Precast Tbk Period 2018-2021

Stock Code	Year	Equity (Rp)	Percentage %	Liabilities (Rp)	Percentage %	Current Assets (Rp)	Percentage %
WSBP	2018	7.882.313.190.464	-	7.340.075.399.350	-	10.236.132.156.003	-
	2019	8.134.550.586.355	3,20%	8.014.571.097.975	9,19%	9.695.354.716.598	5,28%
	2020	-874.103.181.151	-89,25%	9.463.128.936.388	18,07%	4.067.189.304.334	-58,05%
	2021	-2.778.529.065.000	-417,87%	9.660.606.347.159	2,09%	4.205.954.931.153	3,41%

Source: Corporate Financial Statements of PT. Waskita Beton Precast Tbk. Data processed.

According to table 2. PT. Waskita Beton Precast. Tbk showed the lowest achievement of the company's total equity in 2021, which was Rp. -2.778.529.065.000 or decreased by -417,87% from the previous year.

Based on the phenomena described in table 1. and table 2. Above, it shows that the ratio of debt to capital owned by cement subsector companies is very high, but the resulting profitability is not optimal. Where in this study, PT. Waskita Beton Precast Tbk (SWBP) continues to experience a decline in financial performance in 2020-2021. If cash and cash equivalents experience a significant decline and debt to capital swells, it triggers the risk of default. If the company's instability in managing its assets is not optimized, it triggers the emergence of technical insolvency conditions and financial distress analysis which has the potential to lead to bankruptcy.

The results of previous research conducted by Widiasmara & Rahayu (2019) related to differences in Ohlson models, Taffler models, Springate models in predicting financial distress stated that nine industrial sectors listed on the Indonesia Stock Exchange (IDX) in 2015-2017. The best model in predicting financial distress is the taffler model with an accuracy rate of 83,93%, then the Springate Model with an accuracy rate of 54.91% and the Ohlson Model which is the model with the lowest accuracy rate of 6,70%. In line with research, Iswahyudi (2022) explained that the taffler model puts more pressure on the

company's ability to fulfill obligations to its debtors, so that companies with liquidity ratios that are below normal will become companies that have the potential to go bankrupt.

The Taffler method was found using a linear model that was improved and modified to produce 4 ratio indicators with the MDA analysis technique whose accuracy rate reached 95.7% for bankrupt and 100% for non-bankrupt companies (Gunawan & Warninda, 2022).

RESEARCH METHOD

The type of research used in this study is quantitative descriptive. Where the data in the study is described using figures from the annual financial statements consisting of income statements and statements of financial position to see the potential for bankruptcy that occurs in the company PT. Waskita Beton Precast, Tbk. Meanwhile, the source of data in this study is secondary data with documentation collection techniques obtained from the Indonesia Stock Exchange (www.idx.co.id) in the form of annual financial statements for the 2020-2021 period. The place of research was carried out on the official website of the Indonesia Stock Exchange (IDX). The population in this study is the financial statements of 6 cement companies in the 2018-2021 period, including PT. Semen Indonesia (Persero) Tbk, PT. Indocement Tunggal Prakarsa Tbk, PT. Solusi Bangun Indonesia Tbk, PT. Waskita Beton Precast Tbk, PT. Wijaya Karya Beton Tbk, PT. Semen Baturaja (Persero) Tbk. While the sample used is PT. Waskita Beton Precast Tbk in 2020-2021 by looking at the condition of the company's financial reports that continue to experience fluctuation.

The method of analyzing data on financial statements to measure, know and describe the possibility of potential financial distress using the Taffler method can be seen if a company is qualified into one of the cut off points below:

  a. If the value of T < 0.2 then the company is included in the category of Bankrupt.
  b. If the value of $0.2 \leq T \leq 0.3$ then the company is in a grey area condition.
  c. If the value of T > 0.3 then the company is in good health or not bankrupt.

ACTIVITY IMPLEMENTATION AND RESULTS

The Taffler model was first published by R. J. Taffler in 1977. The model was developed so that it has 5 ratio indicators. This model is then modified again to produce 4 ratio indicators using MDA analysis techniques with an accuracy rate of 95,7% for bankrupt companies and 100% for non-bankrupt companies (Taffler, 1984). In the study, Taffler explained, to measure the potential bankruptcy of a company, it is important to compare the analysis of company reports with companies in similar industries. The equation of the Taffler (1984) model follows:

$$\text{T-Score} = 0.53X_1 + 0.13X_2 + 0.18X_3 + 0.16X_4$$

X_1: *Earnings Before Taxed to Current Liabilities*
X_2: *Current Assets to Total Liabilities*
X_3: *Currnet Liabilities to Total Assets*
X_4: *Sales to Total Assets*

Here are some explanations of the ratios used in the Taffler model equation above, namely:

1) *Earning Before Taxes to Currnet Liabilities* (EBTCL)

The ratio of EBTL or Profit before tax to current liabilities is used to show the company's ability to generate profit before tax (Iswahyudi, 2022). This means that the lower the value, the less likely earnings before taxes can cover the company's current liabilities. The value of earnings before taxes is obtained from the income statement and current liabilities are obtained from the statement of financial position. The formula of the EBTCL ratio is as follows:

$$EBTCL_{(x1)} = \frac{Earnings\ Before\ Taxes}{Current\ Liabilities}$$

2) *Current Assets to Total Liabilities* (CATL)

The CATL ratio is used to measure the level of liquidity of the company in fulfilling all its obligations using current assets. If the value of CATL is getting bigger, the company's performance is getting better. Conversely, if the CATL ratio decreases, the company's performance is in poor condition. In the financial statements current assets and total liabilities can be obtained on the statement of the company's financial position. The formula used is:

$$CATL_{(x2)} = \frac{Current\ Assets}{Total\ Liabilities}$$

3) *Current Liabilities to Total Assets* (CLTA)

The CLTA ratio is a ratio that measures how much assets can be financed by current debt. The focus of the CLTA ratio is to describe the liquidity position in paying current liabilities through the total assets owned by the company. The higher the value of current liabilities rather than total assets, the greater the company's burden in repaying loans. Conversely, if the value of current liabilities is less than total assets, the lower the company's burden in repaying loans. In the financial statements, current liabilities and total assets are on the statement of the company's financial position. The formula used to find the CLTA Ratio is:

$$CLTA_{(x3)} = \frac{Current\ Liabilities}{Total\ Assets}$$

4) *Sales to Total Assets* (STA)

The STA ratio is a ratio used to describe all company assets when making a profit from sales. The higher the STA ratio, the better the company's performance. The formula of the STA ratio is:

$$STA_{(x4)} = \frac{Sales}{Total\ Assets}$$

T-Score Calculation Results

The following is a table of the overall ratio analysis of the Taffler model that has been obtained at the company PT. Waskita Beton Tbk which is listed on the Indonesia Stock Exchange for the 2020-2021 period.

Table 3. Taffler model ratio analysis at PT. Waskita Beton Precast Tbk

Stock Code	Account Name	2020	2021	Account Name	2020	2021		Calculation	
								2020	2021
WSBP	EBT	- 4.121.891.709.553	- 1.943.362.438.396	Current Liabilities	7.426.948.646.675	9.623.543.926.198	EBTCL	-0,55	-0,20
	Current Assets	4.067.189.304.334	4.205.954.931.153	Total Liabilities	9.463.128.936.388	9.660.606.347.159	CATL	0,43	0,44
	Current Liabilities	7.426.948.646.675	9.623.543.926.198	Total Assets	8.589.025.755.237	6.882.077.282.159	CLTA	0,86	1,40
	Sales	2.211.413.142.070	1.380.071.332.830	Total Assets	8.589.025.755.237	6.882.077.282.159	STA	0,26	0,20

Source: Data processed (2023)

Based on table 3. Above, the EBCTL ratio (X1) obtained from the calculation of Earnings Before Taxes to Current Liabilities in 2020-2021 decreased by -0,63 from the total EBCTL calculation in 2020 of -0,55 and 2021 of -0,20. This decrease occurred due to the decline in the value of profit before tax reaching a negative value or loss and also the size of the company's current debt resulting in the lower ratio of one of the most influential ratios of the Taffler model, namely earnings before tax to current liabilities and causing some companies to be classified into the red zone. The ratio of earnings before tax to current liabilities is a ratio that measures the level of profitability of the company, if the ratio is low it can be interpreted that the company's performance is less effective in generating profits.

The CATL ratio (X2) obtained from the calculation of Current Assets to Total Liabilities for 2020-2021 increased by 0,01 from the total calculation of CATL in 2020 of 0,43 to 2021 of 0,44. At PT. Waskita Beton Precast is known that the increase in CATL occurred due to the company's current assets increasing to maintain the company's operational costs. The greater the current assets owned by the company, the better the amount of production produced. This can affect the company's burden in repaying loans will be even greater.

The CLTA ratio (X3) obtained from the calculation of Current Liabilities to Total Assets in 2020-2021 increased by 0,61 from the total CLTA calculation in 2020 of 0,86 to 2021 of 1,40. The CLTA ratio is measured to see how much assets are able to be financed by current debt. Where is the liquidity position in paying current liabilities through the total aseets owned by the company. If the value of CLTA is high, the loan repayment rate will be better.

The STA ratio (X4) obtained from the calculation of Sales to Total Assets in 2020-2021 decreased by -0,22 from the total STA calculation in 2020 of 0.26 to 2021 of 0,20. At PT. Waskita Beton Precast Tbk this decline occurred due to losses in the domestic market due to the Covid-19 pandemic. Some infrastructure development stopped in early 2020 and some investors released their shares due to the lack of profit generated, which affected the amount of assets provided by the company in fulfilling its operations.

Based on the results of the Taffler calculation ratio, it can be known the financial condition of the company PT. Waskita Beton Precast Tbk in accordance with the formula provisions below:

Table 4. The value of the analysis ratio uses the Taffler formula on PT. Waskita Beton Precast Tbk Period 2020-2021

Stock Code	Year	Nominal			
		0,53.X1	0,13.X2	0,18.X3	0,16X4
	2020	-0,29	0,05	0,15	0,04
WSBP	2021	-0,10	0,05	0,25	0,03

Source: Data processed (2023)

Based on the results of the Taffler Model calculation above, it can be known the financial condition of PT. PT. Waskita Beton Precast Tbk in accordance with the Taffler formula criteria is known that

$$\text{T-Score} = 0{,}53X_1 + 0{,}13X_2 + 0{,}18X_3 + 0{,}16X_4$$

$\text{T-Score}_{2020} = -0{,}29 + 0{,}05 + 0{,}15 + 0{,}04$

$\text{T-Score}_{2020} = -0{,}05$

While the taffler value for 2021 is

$$\text{T-Score} = 0{,}53X_1 + 0{,}13X_2 + 0{,}18X_3 + 0{,}16X_4$$

$\text{T-Score}_{2021} = -0{,}10 + 0{,}05 + 0{,}25 + 0{,}03$

$\text{T-Score}_{2021} = 0{,}23$

If the cut off value on the T-Score is used to see the potential for bankruptcy in the company PT. Waskita Beton Precast Tbk is:

a. If the value of T < 0.2 then the company is included in the category of **Bankrupt**.
b. If the value of 0.2 ≤ T ≤ 0.3 then the company is in a ***grey area condition***.
c. If the value of T > 0.3 then the company is in **good health** or not bankrupt.

After calculating the value of the financial ratio from the Taffler method, the next step is to analyze the calculation results from Taffler with the T-Score value that has been set to predict the bankruptcy rate of PT. Waskita Beton Precast Tbk for the 2020-2021 period

Research Discussion

The following table is presented that will show the financial condition of the calculation analysis of the taffler method.

Table 5. Analysis of Cut off T-Score value at PT. Waskita Beton Precast Tbk Period 2020-2021 Period 2020-2021

Company Name	Year	Nominal T-Score	Criterion
PT. Waskita Beton Precast Tbk	2020	-0,05	*Distress*
	2021	0,23	*Grey Area*

Source: Data processed (2023)

Based on table 5. above, it can be seen that PT. Waskita Beton Precast Tbk, during 2020 to 2021 its financial performance shows the potential for bankruptcy. It is known that the value of the T-Score in 2020 is -0,05 which indicates that the company is experiencing financial difficulties. In 2021 there was an increase in the T-Score value of 0,23 (indicating a positive number) so that the company's financial condition of PT. Waskita Beton Precast Tbk in 2021 is in the position of Grey Area. This means that during 2020 to 2021 the company's T-Score value is between -0,05 to 0,23, so it is likely that the company has the potential to go bankrupt and may also be able to bounce back depending on the company's policy in decision making. This condition is caused because the value of X1 (Earning Before Taxed to Current Liabilities) is at a negative level which indicates that the lower the value, the less likely Earning Before Taxed can meet its short-term obligations X2 increase in current assets to total liabilities by 0,01% did not have a significant impact on financial difficulties. X3 current liabilities to total assets experienced a significant increase of 0,61% which proves that the ability to return the company's loan expenses is assessed from current assets, but has not been maximized in reducing potential financial difficulties. X4 sales of total assets decreased by -0,22% from 2020 to 2023. This occurs due to weak consumer demand for domestic cement purchases due to predatory pricing so that people tend to buy imported brands for cheaper reasons.

The results of this discussion are in line with Yati & Patunrui (2017) which shows that most companies that are in gray area positions need to anticipate the potential for bankruptcy by improving their financial performance so that the company is in a safe condition. The difference in this study is that the model used in the study is the Altman Z-Socre method with samples in the form of pharmaceutical companies that have gone public and are listed on the IDX for the 2013-2015 period. While the period year in this study is 2 periods with an overview of financial performance statements that show bankruptcy conditions.

CONCLUSION

The results of Taffler's calculations at the company PT. Waskita Beton Precast Tbk for the 2020-2021 period shows that in 2020 the company experienced a Distress condition with a T-Score value of -0.05 below the cut off point value that has been set at > 0.3 in a healthy position (safe). Meanwhile, in 2021 the company PT. Waskita Beton Precast Tbk is in Grey Area condition with a T-Score value of 0.23. If cash and cash equivalents experience a significant decline and debt to capital swells, it triggers the risk of default. If the company's instability in managing its assets triggers the emergence of technical insolvency conditions and financial distress analysis that has the potential to cause bankruptcy. Therefore, in managing and running operations, the company is able to take into account all the risks that occur as well as the role of the company's management and human resources to continue to take corrective actions and restore investor confidence to invest in it.

REFERENCES

Edi, & Tania, M. (2018). Ketepatan Model Altman, Springate, Zmijewski, dan Grover Dalam Memprediksi Financial Distress. Jurnal Reviu Akuntansi dan Keuangan, 79-92.

Gunawan, D., & Warninda, T. D. (2022). Prediksi Financial Distress Menggunakan Model Taffler dan Grover pada Perusahaan yang Terdampak Pandemi Covid-19. Jurnal Bisnis, Manajemen, dan Teknososiopreneur, 1(1), 1-16.

investasi.kontan.co.id. (2019, Agustus). Dipetik Desember 27, 2022, dari https://investasi.kontan.co.id/news/ibu-kota-pindah-ke-kalimantan-begini-kesiapan-emiten-semen

Iswahyudi, M. (2022). Zmijewski, Taffler, Springate dan Grover Model : Analisis Model Prediksi Kebangkrutan. Ekuitas: Jurnal Pendidikan Ekonomi, 10(1), 2549-2292.

Olengga, P., & Fauzi, F. (2020). ANALISIS POTENSI FINANSIAL DITREES PADA INDUSTRI SEMEN TERDAFTAR DI BURSA EFEK INDONESIA. Jurnal Ilmiah Bina Manajemen, 3(1), 47-57.

Pranita, K. R., & Kristanti, F. T. (2020). ANALISIS FINANCIAL DISTRESS MENGGUNAKAN ANALISIS SURVIVAL. Nominal: Barometer Riset Akuntansi dan Manajemen, 9(2), 240-257.

Salim, M. N., & Sudiono. (2017). An Analysis of Bankruptcy Likelihood on Coal Mining Listed Firms in the Indonesian Stock Exchange: An Altman, Springate and Zmijewski Approaches. Eurasian Journal of Economic and Finance, 5(3), 99-108.

Taffler, R. J. (1984). Empirical Models for the Monitoring of UK Corporations. Journal of Banking and Finance, 8(2), 199-227. doi:https://doi.org/10.1016/0378-4266(84)90004

Wulandari, F., Burhanudin, & Widayanti, R. (2017). Analisis Prediksi Kebangkrutan Menggunakan Metode Altman (Z-Score) Pada Perusahaan Farmasi (Studi Kasus Pada Perusahaan Yang Terdaftar Di Bursa Efek Indonesia Tahun 2011-2015). Jurnal Manajemen dan Bisnis, 2(1), 15-27. Dipetik Desember 27, 2022, dari https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwi8ocHp2pj8AhWj8HMBHWKTCfcQFnoECAwQAQ&url=https%3A%2F%2Fsolusibangunindonesia.com%2F&usg=AOvVaw2GM60hqijyjGKVreEy_18b

Yati, S., & Patunrui, K. A. (2017). Analisis Penilaian Financial Distress Menggunakan Model Altman (Z-Score) pada Perusahaan Farmasi yang Terdaftar di Bursa Efek Indonesia Periode 2013-2015. Jurnal Akuntasi, Ekonomi, Dan Manajemen, 5(1), 55-71.

Zatira, D., & Puspitasari, R. (2020). Analisis Z-Score Terhadap Prediksi Kebangkrutan Perusahaan Semen yang Terdaftar di BEI Periode 2016-2019. Prosiding Simposium Nasional Multidisiplin, 430-439.