



Bankruptcy Analysis of Manufacturing Companies Registered on the Jakarta Islamic Index (JII) Based on the Altman Z-Score Method for the 2019-2021 Period

Sohibi Putri Siregar, Nurlaila*

Faculty of Business and Islamic Economics, State Islamic University of North Sumatra, Medan
Jl. William Iskandar Ps. V, Medan Estate, Kec. Percut Sei Tuan, Deli Serdang Regency, North Sumatra, Indonesia

Email: ¹Sohibiputrisiregar@gmail.com, ²Nurlaila@uinsu.ac.id

Correspondence Author Email: Nurlaila@uinsu.ac.id

Submitted: 09/02/2023; Accepted: 24/02/2023; Published: 25/02/2023

Abstract—When costs exceed income, one of the most frequent issues a firm faces is bankruptcy. Analyzing the index of income and spending is crucial for a business to avoid bankruptcy. The goal of this study is to examine manufacturing businesses that are listed on the Jakarta Islamic Index (JII) that have filed for bankruptcy between 2019 and 2021. Using a population of 30 manufacturing enterprises that are registered on JII, this study employs a quantitative descriptive research design. Next, three sample companies—PT Indofood CBP Sukses Makmur Tbk, PT Unilever Indonesia Tbk, and PT Kalbe Farma Tbk—were collected using the purposive sampling approach utilized in this study. The data analysis approach employs five variables with the Altman Z-score method. The study's findings indicate that PT Indofood CBP Sukses Makmur Tbk has faced significant financial difficulties in the last period (2021). Later, PT Unilever Indonesia Tbk, which was also dealing with severe financial issues, experienced the same scenario. This firm, in contrast to PT Kalbe Farma Tbk, is regarded as safe because it has no issues with its financial situation.

Keywords: Altman Z-Score; Financial Distress; Manufacturing Company.

1. INTRODUCTION

A company that was founded with a hope of getting maximum profits. It aims to be able to provide welfare to company owners and employees who work in the company (Ramlah, 2021). In order for this goal to be achieved, optimal company performance, planned decision making and careful control of operational systems are needed, especially those related to company finances (Suriyanti et al., 2020). A business trip certainly will not always be good. The company will certainly experience ups and downs in its business journey. No company is spared from the risk of bankruptcy. From this, performance improvement must be continuously improved and maintained by each company to maintain business continuity and maintain financial conditions to remain stable and avoid the risk of bankruptcy. The company's foundation can be strengthened by increasing the company's income. The company's own finances can be monitored by traveling using the capital market. According to Ogachi et al. (2020) financial ratios can be used to see the company's financial condition, and can be used to predict the impending bankruptcy of the company. In capital market activities, stock prices are an important factor that must be considered, because stock prices in companies can reflect the performance of these companies (Huy et al., 2020). Investors will look for companies with good performance to invest their capital so that they get the desired profit. Historical financial reports are very important to analyze because they relate to company performance. According to Roychowdhury et al. (2019) financial reports are basically the result of a reflection of the many transactions that occur within a company. These financial statements have been prepared and interpreted for the benefit of management and other parties who are concerned or have an interest in the company's financial data.

Bankruptcy is the company's inability to pay its obligations when they are due (Abuselidze & Slobodanyk, 2020; Shubhan, 2020). A company is considered bankrupt when expenses are greater than income and lasts a long time. If these problems are not resolved immediately, then bankruptcy cannot be avoided thereby threatening the continuity of the company and resulting in a smaller asset value compared to its total liabilities (Nafisa et al., 2022).

Jakarta Islamic Index or commonly called JII is one stock index which exist in Indonesia which calculates the average price index stock for the type of shares that meet the criteria sharia Jakarta Islamic Index (JII) was first launched on the Indonesian capital market on July 3, 2000. The purpose of establishing JII is to increase investor confidence to invest in sharia-based stocks and provide benefits for investors in implementing Islamic sharia to invest in stock exchanges. JII is also expected to be able to support the transparency and accountability process of sharia-based shares in Indonesia. JII is the answer to the wishes of investors who want to invest according to sharia. In other words, JII becomes a guide for investors who want to invest their funds according to sharia without fear of being mixed up with ribawi funds. In addition, JII is a performance measure (benchmark) in choosing a halal stock portfolio. One type of company listed on JII is a company engaged in the manufacturing sector. A manufacturing company itself is a company that manages raw goods into finished or semi-finished goods that have sales values to be marketed to consumers on a larger scale (Zheng et al., 2022). In a manufacturing company itself, of course, it cannot be separated from elements such as the production process, types of inventory and production costs. Cost element this is one of the elements that affects how much big profit or loss in a company, so that it becomes a benchmark for how the company can survive or on the contrary experience bankruptcy (Matejić et al., 2022).

Bankruptcy can be predicted early with a method. One of the methods used to detect bankruptcy is the method Z-score introduced by Edward L Altman. According to Pantoja Aguilar et al. (2021), the multivariate model



that has been tested through time is the Altman model. -z score. Analysis Z-Score is a method for predicting the viability of a company by combining several common financial ratios and giving different weights to one another. That means, using the Z-Score method, the possibility of bankruptcy of a company can be predicted (Siekelova et al., 2019). In the *cnnindonesia.com* article on May 26 2020, Hertz Car Rental Company, which is the largest car rental company in the world in the United States, went bankrupt under Corona. In addition, reported on the *detik.com* website, PT. Sariwangi Agricultural Estate Agency (SAEA) officially went bankrupt in 2018. According to *detik.com* records, PT. Sariwangi was declared bankrupt because he could not pay his debt of 1.05 trillion to Bank ICBC Indonesia. Bankruptcy of a company can occur due to a company's failure to carry out its operations. This is an accumulation of long-term company management mistakes, so every company must anticipate so as to avoid or reduce the risk of bankruptcy.

The company's financial statements are an important source of information to find out how the company is doing (Angela, 2020). Financial statements is an overview of the financial condition of a company at a certain time (Mamahit et al., 2019). With the existence of a company's financial statements, things such as first, working capital can be studied. Negative net working capital is most likely to have problems covering short-term liabilities. However, companies with positive net working capital rarely face difficulties in paying off their obligations Both retained earnings, which shows how much of the company's income is not paid out in the form of dividend to shareholders, the third is related to earnings before interest, namely showing the company's ability to generate profits from company assets, before paying interest and taxes. and the fourth level, sales to total assets, and finally the stock market to total debt, which describes the company's ability to know the amount of company capital used to bear debt burdens in the long term. The company will go bankrupt if it cannot generate sufficient cash flow or if the total liabilities exceed the total assets.

Anggraini (2017) explained that PT Indofood CBP Sukses Makmur Tbk and PT Unilever Indonesia Tbk were registered on the Jakarta Islamic Index for the 2015-2018 period with Altman Z- Score included in the category of healthy or safe companies. The research explained that companies such as Unilever and Indofoo were in the safe category if analyzed in 2019. However, this is not the same, from the *Investor.id* page it was informed that Nilzon Capital assesses that UNVR has always been top loser in a series of issuers on LQ45 since 2018. From 2018 to February 2022, UNVR shares decreased by 62% or 66% when taking into account dividend payments. The cause of the decline in shares was due to the weakening financial performance and also the effectiveness of management. Other companies such as Indofood have also experienced a decline in profits until the first semester of 2022. This is informed on the website *Investor.id* on September 5 2022 that even though profits have fallen, analysts still have a positive view of Indofood (INDF). Based on data, Indofood's net profit weakened 15.5% from Rp. 3.43 trillion to 2.90 trillion in semester 1 2022. Furthermore, PT Kalbe Farma Tbk (KLBF) does the same. In page *Beritasatu.com* on December 7, 2015 regarding Hard Challenges for Kalbe Farma the explained that throughout 2015, the company was entering a difficult period due to the temporary suspension of several production lines, decreased profit margins on sales of generic drugs, the weakening of the rupiah exchange rate, and a decrease in people's purchasing power.

According to a number of earlier studies, including one by Nafisatin (2014), it was possible to predict company bankruptcy by comparing the financial performance of companies that were listed and delisted on the Indonesia Stock Exchange between 2011 and 2013 using the Altman method (Z-Score). Eight of the nine listed enterprises were, according to the findings, in a safe status for three years running, while one was in a vulnerable state. According to the delisted firms, seven of them have been potentially bankrupt for three years in a row, while the other two have changed financial health. The study, "Financial Distress Study Using the Altman Z-Score Method at PT. Golden Plantations Tbk. Period 2014–2018," was done (Idi & Borolla, 2021). The study's findings show that PT. Golden Plantation's Altman Z-score decreased from 1.1 in 2015 to 1.1 in 2018, indicating that the business is in danger of failing. In the upcoming years, the corporation will also have financial issues. This is a result of the company's choice of debt. Utilization at debt-ridden businesses often rises annually, outpacing the value of existing assets to the point where working capital is negative.

Based on the background described above, the problems that can be formulated are: How are the bankruptcy prediction results of PT Indofood CBP Sukses Makmur Tbk, PT Unilever Indonesia Tbk and PT Kalbe Farma Tbk (KLBF) using the Altman Z Score method. Meanwhile, the purpose of this study is to describe how much the three companies will experience bankruptcy in the future. This research is expected to provide empirical evidence related to the prediction of corporate bankruptcy.

2. RESEARCH METHODS

This piece uses a type of quantitative descriptive research. This research was conducted by collecting data and figures in the form of reports on manufacturing companies listed in the Jakarta Islamic Index (JII) in the 2019–2021 financial reports. The data was obtained by accessing the official website of the Indonesia Stock Exchange, namely www.idx.co.id. The population in this study is 30 manufacturing companies registered on the Jakarta Islamic Index (JII), where each company has its own annual financial report for the 2019–2021 period. Meanwhile, the sampling in this study used a purposive sampling method, namely a sampling technique that aims to select several companies as samples from the entire population of 30. The criteria used to determine the sample are described below.

1. Companies registered on the Jakarta Islamic Index (JII)



2. Companies listed on the Jakarta Islamic Index (JII) that have complete financial reports for 2019–2021. Based on the above criteria, three manufacturing companies were identified that met the criteria and could thus be sampled. The three companies in question are PT Indofood CBP Sukses Makmur Tbk, PT Unilever Indonesia Tbk, and PT Kalbe Farma Tbk.

In this study, there are five variables that serve as indicators for analyzing the bankruptcy of a company, namely working capital (X1), retained earnings (X2), earnings before interest and taxes (X3), stock market value (X4), and sales (X5). The five variables above were analyzed using the Altman Z-Score method. The equation of the Altman model is as follows:

$$Z = 0,717(X1) + 0,874(X2) + 3,107(X3) + 0,420(X4) + 0,998(X5) \tag{1}$$

Description:

Z = Financial Distress Index

X1 = Working Capital to Total Assets

X2 = Retained Earning Befor Interest and Taxes to Total Assets

X3 = Earning Before Interest and Taxes to Total Assets

X4 = Book Value of Equity to Book Value of Debt

X5 = Sales to Total Assets

The measurement criteria in this study are:

Not bankrupt if $Z > 2.90$

Areas prone to bankruptcy = $1.20 - 2.90$

Bankrupt if $Z < 1.20$

3. RESULTS AND DISCUSSION

3.1 Results

The object of this research is a manufacturing company that is consistently registered in Jakarta Islamic Index (JII) and publishes annual financial reports for the period 2019 to 2021. To measure the level of bankruptcy, the required financial report data are:

3.1.1. Working Capital/ Total Assets (X1)

The working capital referred to here is the difference between current assets (current asset) with current debt (current liabilities). While the total assets are all assets in the company.

$$X_1 = \frac{\text{Working capital}}{\text{Total assets}} \tag{2}$$

Table 2. Working Capital/Total Assets (X1)

Year	KLBF	ICBP	UNVR
2019	0,426622191	0,260107064	0,219618021
2020	0,438684361	0,111403085	0,220562803
2021	0,474450716	0,012550913	0,251878016

3.1.2. Retained Earnings/ Total Assets (X2)

Retained earnings show how much of a company's income is not paid out in the form of dividends to shareholders. Retained earnings against total assets are used to measure cumulative profits.

$$X_2 = \frac{\text{Retained Earnings}}{\text{Total assets}} \tag{3}$$

Table 3. Retained Earnings/Total Assets (X2)

Year	KLBF	ICBP	UNVR
2019	0,011150479	0,001162511	0,000739006
2020	0,011125054	0,00048268	0,000743135
2021	0,010845273	0,000465839	0,000800271

3.1.3 Profit Before Interest and Tax/ Total Assets (X3)

Several indicators that can be used to detect problems with the company's profitability include high accounts receivable, low sales, large inventories, low accounts receivable turnover, low company credibility, and the willingness to give credit to consumers who cannot pay on time.

$$X_3 = \frac{\text{Profit Before Interest and Tax}}{\text{Total Assets}} \tag{4}$$

Table 4. Profit Before Interest and Tax/Total Assets (X3)



Year	KLBF	ICBP	UNVR
2019	0,011150479	0,001162511	0,000739006
2020	0,011125054	0,00048268	0,000743135
2021	0,161426093	0,022433147	0,1143174

3.1.4 Stock Market Value/Total Debt (X4)

The stock market value ratio here is closing price year multiplied by total share annual. The capital referred to here is a combination of the market value of ordinary capital and shares preferred, while debt includes current liabilities and long-term debt.

$$X_4 = \frac{\text{Market Value of Shares}}{\text{Total Debt}} \tag{5}$$

Table 5. Market Value of Shares/Total Debt (X4)

Year	KLBF	ICBP	UNVR
2019	4,693707	2,215537	0,343703
2020	4,261929	0,94458	0,316553
2021	4,832328	0,86393	0,293021

3.1.5 Sales/Total Assets (X5)

It is also an activity ratio that detects the ability of the company's funds embedded in all revolving assets in a certain period. This ratio can also be used to measure the ability of the capital invested by a company to produce revenue.

$$X_5 = \frac{\text{Sales}}{\text{Total assets}} \tag{6}$$

Table 6. Sales/Total Assets (X5)

Year	KLBF	ICBP	UNVR
2019	1,247284208	1,230730488	2,111617042
2020	1,140536221	1,204905052	2,081054866
2021	1,163838193	0,145696023	0,500740456

After obtaining the results of the calculation of 5 (five) X variables for each company, then the next step is the calculation of the Z-Score. After obtaining the Z score results, then this value is compared with the criteria set by Altman so that it can predict the financial condition of each company. In this study using the Revised Altman model are as follows:

$$Z = 0.717(X1) + 0.874(X2) + 3.107(X3) + 0.420(X4) + 0.998(X5) \tag{7}$$

Table 7. Analysis Results of Manufacturing Companies 2019-2021 with the Z-Score Prediction Method

Company	2019 Predictions	2020 Predictions	2021 Predictions
KLBF	4,0435 Safe	3,7423 Safe	4,0329 Safe
ICBP	2,9334 Less Safe	1,9686 Needs Handling	0,5862 Bankrupt
UNVR	3,5679 Safe	3,4288 Safe	0,7941 Bankrupt

The results of the analysis show that of the 3 manufacturing companies studied by the author, it shows that there are two manufacturing companies that are predicted to experience problems in management and financial structure, namely PT Indofood and Unilever. The results of Z calculations in 2020 PT. Indofood CBP Sukses Makmur Tbk. have value cut off of 1.9686 which is in the criteria prone to bankruptcy.

Furthermore, the results of Z calculations in 2021 PT. Unilever Indonesia Tbk has value cut off of 0.5862 and PT. Indofood CBP Sukses Makmur Tbk is 0.7941, if interpreted it is in the bankrupt category because the value obtained is $Z < 1.88$, so in this case the company is experiencing serious financial problems.

3.2 Discussion

The following is the result of calculating the Z-Score value of PT Kalbe Farma Tbk (KLBF) PT Indofood CBP Sukses Makmur Tbk, and PT Unilever Indonesia Tbk. The data used to calculate the Z-Score is data from annual financial reports. Annual data in 2019-2021. Based on the results of calculations using the Altman Z-Score, this research classifies PT Kalbe Farma Tbk (KLBF) PT Indofood CBP Sukses Makmur Tbk, and PT Unilever Indonesia Tbk fall into 2 categories, namely safe and vulnerable.

3.2.1 PT Kalbe Farma Tbk (KLBF)

The results of calculating the variables and Z-Score values are shown in Table 8 as follows.

Tabel 8. Variable Results and Altman Z-Score Values PT. Kalbe Farma Tbk.



Year	X1	X2	X3	X4	X5	Z	Criteria
2019	0,4267	0,0112	0,0112	4,6937	1,2473	4,0435	Safe
2020	0,4387	0,0111	0,0111	4,2619	1,14054	3,7423	Safe
2021	0,4745	0,0109	0,1615	4,8323	1,1639	4,0329	Safe

Based on these data, PT Kalbe is predicted to be safe from 2019 to 2021. The X1 variable is working capital to total assets. The results above show an increase from year to year and are positive, from 0.4267 to 0.4745, so it can be predicted that PT Kalbe with a positive net working capital rarely faces difficulties in paying off its obligations. X2 variable namely retained earnings to total assets. When viewed from the results of the analysis, it seems that there has been an insignificant decrease, so it is still categorized as safe. The decline occurred from point 0.0112 to 0.0109, which is equal to 0.0003. This shows that the company's income that is not paid in the form of dividends to shareholders has increased. X3 variable shows earnings before interest on total assets. This shows that the company generates profit from the company's assets, before interest and tax payments. The results obtained in 2019 were 0.0112 and experienced a decrease of 0.0001 in 2020, then in 2021 experienced a significant increase, namely to 0.1615. X4 variable related to the level of sales obtained by the company. Referring to the data above, PT Kalbe in marketing its products in 2019-2021 is fluctuating. Furthermore, variable X5 is related to the stock market to total debt. Even though it is predicted to fluctuate, it is still in a safe condition. After all the variables were analyzed, the Z score was obtained. PT Kalbe Farma is included in the safe category. Based on research findings, it was concluded that the company did not experience problems with financial conditions. This study confirms Chauhan and Banerjee (2018) research findings that good working capital management, particularly in financial concerns, will be impacted by sound working capital arrangements. Even in a time of crisis, a company's sound financial standing will be a strength in avoiding bankruptcy (Horák & Krulický, 2019).

3.2.2 PT Indofood CBP Sukses Makmur Tbk

The results of calculating the variables and Z-Score values are shown in Table 9 as follows.

Table 9. Variable Results and Altman Z-Score Values of PT. Indofood CPB Sukses Makmur Tbk. Year 2019-2021

Year	X1	X2	X3	X4	X5	Z	Criteria
2019	0,2601	0,0017	0,0112	2,2155	1,2307	2,9334	Less Safe
2020	0,1114	0,0005	0,0005	0,9446	1,2049	1,9686	Need Handling
2021	0,0125	0,0005	0,0224	0,8639	0,1457	0,5862	Bankrupt

Based on this data, Indofood CPB Sukses Makmur Tbk is predicted to be vulnerable. X1 variable related to working capital to total assets. The results above show a decrease but still have a positive value, from 0.2601 to 0.0125, so it can be predicted that PT Kalbe with a net working capital that is positive and experiencing a decrease is predicted to face difficulties in paying off its obligations. X2 variable namely retained earnings to total assets. When viewed from the results of the analysis, it appears that there has been a significant decrease. The decline occurred from point 0.0117 to 0.0005. This shows that the company's income that is not paid in the form of dividends to shareholders has increased by 0.0112. X3 variable shows earnings before interest on total assets. This shows that the company generates profit from the company's assets, before interest and tax payments. The results obtained in 2019 to 2021 fluctuate.. Variable X4 is related to the level of sales obtained by the company. Referring to the data above, PT Indofood in terms of product sales in 2019-2021 has experienced a drastic decline. It seems that in 2019 it was 2.2155, meanwhile in 2021 it decreased to 0.8639. Furthermore, variable X5 is related to the stock market to total debt. Based on the results of the analysis, PT Indofood experienced a decline in the stock market and an increase in terms of total debt. Then get the value of Z Score. Based on research findings, it was concluded that, PT Indofood is included in the unsafe category in 2019, namely the Z Score of 2.9334, which is between $2.7 < Z < 2.99$, in 2020 it is predicted that treatment is needed due to the Z Score 1.9686 which is between $1.8 < Z < 2.69$. Even so, the company will only experience financial problems if it does not improve both management and financial structure. Furthermore, in 2021 it is in the bankrupt category because it has a Z Score value of 0.5862. In this case, the company experienced serious financial problems. The company will go bankrupt if it cannot generate sufficient cash flow or if the total liabilities exceed the total assets. This study supports the results of Nugrahanti et al's. (2020) study that if a company experiences financial problems, especially if it is unable to pay its obligations, it will have an impact on bankruptcy.

3.2.23 PT Unilever Indonesia Tbk

The results of variable calculations and Z-Score values are shown in Table 10 as follows.

Table 10. Variable Results and Altman Z-Score Values of PT. Unilever Tbk. Year 2019-2021

Year	X1	X2	X3	X4	X5	Z	Criteria
2019	-0,2196	0,0007	0,0007	0,3437	2,1116	3,5679	Safe
2020	-0,2206	0,0007	0,0007	0,3165	2,0811	3,4288	Safe
2021	-0,2519	0,0008	0,1143	0,2930	0,5007	0,7941	Bankrupt



Based on these data, PT Unilever Indonesia, Tbk is predicted to be vulnerable. X1 variable related to working capital to total assets. The results above show an increase and a negative value, namely from -0.2196 to -0.2519, so it can be predicted that PT Unilever Indonesia Tbk. Those with negative net working capital are likely to have problems covering their short-term obligations. X2 variable namely retained earnings to total assets. If seen from the results of the analysis, it seems there is an increase. The increase occurred from point 0.0007 to 0.0008. This shows that the company's income that is not paid in the form of dividends to shareholders has decreased by 0.0001 from year to year. X3 variable shows earnings before interest on total assets. This shows that the company generates profit from the company's assets, before interest and tax payments. The results obtained in 2019 to 2021 saw a significant increase, from 0.0007 to 0.1143. X4 variable related to the level of sales obtained by the company. Referring to the data above, PT Unilever Indonesia in terms of product sales in 2019-2021 has decreased. It appears that in 2019 it was 0.3437, while in 2021 it decreased to 0.2930. Furthermore, variable X5 is related to the stock market to total debt. Based on the results of the analysis, PT Unilever Indonesia experienced a decline in the stock market and an increase in terms of total debt. Then get the value of Z Score. Based on research findings, it was concluded that, PT Unilever Indonesia entered in 2019 and 2020 in the safe category. The company does not experience problems with financial conditions. However, in 2021 a Z score of 0.7941 is obtained, so it is in the bankrupt category. PT Unilever Indonesia in this case is experiencing serious financial problems.

4 CONCLUSION

Based on the results of the research and discussion using the altman z-score method, the results show that: PT Kalbe Farma. The results of the calculation of the Z Score from 2019 to 2021 obtained successive results of 4.0435, 3.7423 and 4.0329. This is included in the safe category because $Z > 2.99$ so that in this case the company does not experience problems with financial conditions. PT Indofood shown the Z Score, in 2019 are 2.9334. This is included in the less safe category, which is between $2.7 < Z < 2.99$. Furthermore, in 2020 the Z Score is 1.9686 so it is predicted that it needs treatment, which is between $1.8 < Z < 2.69$. In this case the company will only experience financial problems if it does not improve both management and financial structure. Finally, 2021 has a Z Score of 0.5862 which is in the bankruptcy category. PT Indofood experienced serious financial problems. PT Unilever Indonesia shown the Z Score calculation, in 2019 and 2020 are in the safe category, namely 3.5679 and 3.4288 respectively because $Z > 2.99$ so that the company does not experience problems with financial conditions. However, in 2021 a Z score of 0.7941 is obtained, so it is in the bankrupt category. PT Unilever Indonesia in this case is experiencing serious financial problems.

REFERENCES

- Abuselidze, G., & Slobodanyk, A. (2020). Analysis and control of bankruptcy and reorganization processes: Case studies using accounting data. *E3S Web of Conferences*, 164, 1–8. <https://doi.org/10.1051/e3sconf/202016409036>
- Angela, D. (2020). Financial Distress: The Impacts Of Profitability, Liquidity, Leverage, Firm Size, And Free Cash Flow. *International Journal of Business, Economics and Law*, 22(1), 1.
- Anggraini, L. (2017). Prediksi Potensi Kebangkrutan Perusahaan Manufaktur Yang Terdaftar Di Jakarta Islamic Index Menggunakan Metode Altman Z-Score Periode 2011-2015 [Institut Agama Islam Negeri (IAIN) Bengkulu]. http://repository.iainbengkulu.ac.id/1417/0Ahttp://repository.iainbengkulu.ac.id/1417/1/Lia_Anggraini.pdf
- Chauhan, G. S., & Banerjee, P. (2018). Financial constraints and optimal working capital – evidence from an emerging market. *International Journal of Managerial Finance*, 14(1), 37–53. <https://doi.org/10.1108/IJMF-07-2016-0131>
- Horák, J., & Krulický, T. (2019). Comparison of exponential time series alignment and time series alignment using artificial neural networks by example of prediction of future development of stock prices of a specific company. *SHS Web of Conferences*, 61, 01006. <https://doi.org/10.1051/shsconf/20196101006>
- Huy, D. T. N., Loan, B. T. T., & Anh, P. T. (2020). Impact of selected factors on stock price: A case study of Vietcombank in Vietnam. *Entrepreneurship and Sustainability Issues*, 7(4), 2715–2730. [https://doi.org/10.9770/jesi.2020.7.4\(10\)](https://doi.org/10.9770/jesi.2020.7.4(10))
- Idi, C. M., & Borolla, J. D. (2021). Analisis Financial Distress Menggunakan Metode Altman Z–Score pada PT. Golden Plantation Tbk. Periode 2014-2018. *PUBLIC POLICY (Jurnal Aplikasi Kebijakan Publik & Bisnis)*, 2(1), 102–121. <https://doi.org/10.51135/publicpolicy.v2.i1.p102-121>
- Mamahit, B. L. ., Pangemanan, S. ., & Tulung, J. . (2019). The Effect of Mergers and Acquisitions on Financial Performance of Companies Listed in Indonesia Stock Exchange. *Jurnal EMBA*, 7(4), 5903–5913.
- Matejić, T., Knežević, S., Arsić, V. B., Obradović, T., Milojević, S., Adamović, M., Mitrović, A., Milašinović, M., Simonović, D., Milošević, G., & Špiler, M. (2022). Assessing the Impact of the COVID-19 Crisis on Hotel Industry Bankruptcy Risk through Novel Forecasting Models. *Sustainability (Switzerland)*, 14(8). <https://doi.org/10.3390/su14084680>
- Nafisa, A., Muhammad, H., & Sari, N. P. (2022). Corporate bankruptcy: Evidence from the plastics and packaging industry in Indonesia. *International Journal of Research in Business and Social Science* (2147- 4478), 11(6), 165–174. <https://doi.org/10.20525/ijrbs.v11i6.1942>
- Nafisatin, M. (2014). Implementasi Penggunaan Metode Altman (Z-Score) Untuk Menganalisis Estimasi Kebangkrutan (Studi Pada PT Bursa Efek Indonesia Periode 2011-2013). Brawijaya.
- Nugrahanti, Y. W., Sutrisno, T., Rahman, A. F., & Mardiaty, E. (2020). Do firm characteristics, political connection and corporate governance mechanism affect financial distress? (Evidence from Indonesia). *International Journal of Trade and Global Markets*, 13(2), 220–250. <https://doi.org/10.1504/IJTM.2020.106753>
- Ogachi, D., Ndege, R., Gaturu, P., & Zoltan, Z. (2020). Corporate Bankruptcy Prediction Model, a Special Focus on Listed Companies in Kenya. *Journal of Risk and Financial Management*, 13(3), 47. <https://doi.org/10.3390/jrfm13030047>



- Pantoja Aguilar, M. P., Pizano Ramírez, G. de M., Lerma Torres, B., & Zavala Vargas, M. Á. (2021). Testing Altman's Z''-Score to assess the level of accuracy of the model in Mexican companies. *Nova Scientia*, 13(27), 1–25. <https://doi.org/10.21640/ns.v13i27.2881>
- Ramlah, R. (2021). The Effect of Profitability and Leverage on Stock Return of Food and Beverage Companies. *Point of View Research Management*, 2(2), 139–150. <https://journal.accountingpointofview.id/index.php/povrema>
- Roychowdhury, S., Shroff, N., & Verdi, R. S. (2019). The effects of financial reporting and disclosure on corporate investment: A review. *Journal of Accounting and Economics*, 68(2–3), 101246. <https://doi.org/10.1016/j.jacceco.2019.101246>
- Shubhan, M. H. (2020). Legal protection of solvent companies from bankruptcy abuse in Indonesian legal system. *Academic Journal of Interdisciplinary Studies*, 9(2), 142–148. <https://doi.org/10.36941/ajis-2020-0031>
- Siekelova, A., Kovalova, E., & Ciurlau, F. C. (2019). Prediction Financial Stability of Romanian Production Companies Through Altman Z-Score. *Ekonomicko-Manazerske Spektrum*, 13(2), 89–97. <https://doi.org/10.26552/ems.2019.2.89-97>
- Suriyanti, Firman, A., Nurlina, Ilyas, G. B., & Putra, A. H. P. K. (2020). Planning strategy of operation business and maintenance by analytical hierarchy process and strength, weakness, opportunity, and threat integration for energy sustainability. *International Journal of Energy Economics and Policy*, 10(4), 221–228. <https://doi.org/10.32479/ijeeep.9267>
- Zheng, Q., Wang, J., Liu, L., Hu, J., & Zhao, R. (2022). Exploring the Market Opportunity for Healthy Semi- Finished Meals in China. *2022 2nd International Conference on Economic Development and Business Culture (ICEDBC 2022)*, 1821–1826.