ANALYSIS OF MODIFICATION ALTMAN Z-SCORE METHOD IN PREDICTING BANKRUPTCY IN LQ45 COMPANY

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Abstract

The purpose of the study was to predict bankruptcy rates in companies indexed in LQ45. The study was conducted on 20 companies as samples were taken based on purposive sampling techniques for the period 2019 – 2021. The research method used is explanatory with descriptive investigations. The results showed that companies that met the healthy category in 2019, 15 companies, in 2020, 13 companies, and in 2021, 14 companies. Grey area category in 2019 – 2020, 3 companies, in 2021, 2 companies. For the bankruptcy category in 2019, 2 companies, and in 2020 – 2021, 4 companies.

Keywords: Altman Z-score, bankruptcy, LQ45

INTRODUCTION

Business activities in the global era show that competition between similar and dissimilar companies is very tight. Intense competition has resulted in companies now being required to innovate and fulfill the very complex demands of society. The survival and development opportunities of a company are strongly influenced by the availability of funds. Companies need to have access to a source of funds, namely the capital market. The capital market is an alternative for investors who want to make long-term investments.

Before investing their funds in a company, investors and creditors will first look at the financial health condition of the company by seeing whether the company is included in the LQ45 indexed stock group or not. Companies that are included in LQ45 have good financial reports because they show good growth prospects, besides that several companies, have remained in LQ45 for several periods. This shows that long-term investment in these companies can be promising for investors (Rizkia, 2013).

The criteria for shares included in the calculation of the LQ45 stock index are 1. The company has been listed on the Indonesia Stock Exchange (IDX) for at least 3 months; 2. Included in 60 shares based on transaction value in the regular market, of those 60 shares 30 shares with the largest transaction value will automatically be included in the LQ45 index calculation and the remaining 15 shares using the criteria of transactions in the regular market, frequency of transactions in the regular market and market capitalization. Therefore, it is not easy for a company to stay in the LQ45 index because every six months a choice is made with several predetermined criteria. If these criteria cannot be met by a company's shares, then the company is excluded from the LQ45 stock index list.

PT. Chandra Asri Petrochemical Tbk (TPIA), the largest petrochemical company in Indonesia, is a business group owned by tycoon Prajogo Pangestu, a subsidiary of PT Barito Pacific Tbk. This issuer has been listed on the IDX since June 24, 1996, on the development board, and has been in and out of the LQ45 index list, in connection with research conducted in the 2019 – 2021 period. In 2019 this issuer was still listed on the LQ45 stock index until January 2020, however. in the period February 2020 – January 2021, TPIA is out of the LQ45 index list, because TPIA's stock performance and financial performance weakened throughout 2020 due to the pandemic. Its depressed business throughout 2020 caused TPIA to suffer losses, TPIA's shares closed at Rp 9,075 per share at the end of 2020. When compared to the price at the close of trading at the end of the year, TPIA's shares have fallen by 12.53% (www.bigalpha.id). TPIA re-entered the LQ45 index list for the period February 2021 – January 2022.

Based on this phenomenon, shows how easy it is for a company to leave the LQ45 index in one period and re-enter in the next period. Research conducted by Mochamad Kohar Mudzakar (2018) with the title "Implementation of the Altman Z-Score Method to Predict Company Bankruptcy". The results showed that: 1. Healthy category in 2010, 15 companies, and in 2011-2013, 14 companies; 2. The vulnerable category in 2010, 3 companies, in 2011-2012, 4 companies, and in 2013, 2 companies; 3. Bankrupt category in 2010-2012, 1 company, and in 2013, 3 companies.

Research by Herry Goenawan Soedarso, Indrayenti, and NM Oldy Apriyanto (2019) with the title "Analysis of the Altman Z-Score Model in Measuring Potential Bankruptcy of Companies (Empirical Study on Consumer Goods Industrial Companies Listed on the Indonesia Stock Exchange 2013 - 2017) The results show that: during 2013 – 2017 of the 36 sample companies, 20 companies with good performance were in the healthy category (55.56%) because they exceeded the Z-Score standard of 2.99 consecutively.

Based on the description above, it is easy to change the list of shares on the LQ45 index, so every company and investor needs to first analyze the level of potential bankruptcy. One of them is by using the Altman Z-score method, the earlier signs of bankruptcy are known, the better for companies and investors to immediately determine and take steps to prevent bankruptcy. Based on this, the researcher is interested in conducting research analysis of modified altman z-score method in predicting bankruptcy in lq45 company.

LITERATURE REVIEW
Financial Statements
Financial statements are part of the financial reporting process, complete financial statements usually include balance sheets, income statements, statements of changes in financial position, notes, and other reports, as well as explanatory materials that are part of the integrity of financial statements in addition to schedules and additional information related to that information. (IAI, 2009: 1).

Financial Ratio Analysis
Breaking down financial statement items into smaller units of information and looking at their significant or meaningful relationships with one another, both quantitative and non-quantitative data, to know deeper financial conditions which are very important in the process of producing sound decisions. appropriately called financial ratio analysis (Harahap, 2011:190). One way of analyzing financial statements is by using ratio analysis, which is an analysis used to determine the relationship between items in a financial report or posts (Kasmir, 2013:72; Effendi, Affandi & Sidharta, 2016).

Bankruptcy
Based on Law Number 4 of 1998, bankruptcy is defined as a condition where an entity is declared by a court decision that the entity has two or more creditors and is unable to pay off its obligations at least one debt that is due and collectible.
The signs that can be seen against a company that is experiencing difficulties in its business and possibly financial difficulties include:
1. Significantly decreased sales or revenue.
2. Decrease in profit and or cash flow from operations.

3. The stock market price decreased significantly.
4. Decrease in total assets.
5. A large probability of failure in the industry or industries with the same risk.
6. Young Companies, young companies generally experience difficulties in the early years of their operations, and if they are not supported by a strong source of capital, they can end up in bankruptcy.
7. Significant cuts in dividends. (Rico Lesmana & Rudy Surjanto, 2014: 183-184).

Predicting Bankruptcy

At this time many formulas have been developed to answer the problem of bankruptcy, one of which is considered popular and widely used in various research and analysis, in general, is the Altman bankruptcy model, this model is more commonly called the Altman Z-score (Fahmi, 2013:158).

In the current study, our empirical analysis focuses on the performance of the Z (Altman).

$$Z'' = 6,56 \ X1 + 3,26 \ X2 + 6,72 \ X3 + 1,05 \ X4$$

Note:
Z'' = Bankruptcy Index
X1= *Working Capital: Total Asset*
X2= *Retained Earnings: Total Asset*
X3= *Earning Before Interest and Tax: Total Asset*
X4= *Book Value of Equity: Total Debt*

Classification:
1)   If Z'' < 1,1: Bankrupt.
2)   1,1 < Z'' < 2,6: *Grey area.*
3)   Z'' > 2,6: Healthy.

Note:
X1: *WCTA*. A ratio that shows the company's ability to generate net working capital from the total assets owned by the company.
X2: *RETA*. This ratio measures the accumulated profit during the company's operations. The age of the company affects this ratio because the longer the company operates, it is possible to facilitate the accumulation of retained earnings. The age of the company can cause companies that are still relatively young in general to show low ratio results, except for those whose profits are very large in the early days of their establishment.
X3: *EBITTA*. A ratio that measures the ability of capital invested in overall assets to generate profits for all investors, including shareholders. This ratio serves as a safety tool if the company experiences financial failure, therefore this ratio is considered the most contributing to assessing the viability of the company.

X4: *BVEL*. The capital in question is a combination of the market value of ordinary capital and preferred stock, while debt includes current debt and long-term debt.

RESEARCH METHODS

This research is research with a descriptive study approach to describe and measure company bankruptcy (secondary data). (www.idx.co.id). The population is included in the LQ45 stock index constantly from 2019 to 2021. The sample selection is purposive sampling to obtain a representative sample based on the specified criteria. Determination of sample criteria is needed to avoid errors in determining the research sample, which in turn will affect the results of the analysis.

Research sample:
1. Companies included in the LQ45 stock index.
2. Period 2019 – 2021 (continuously).
3. Companies other than the financial sector.

Table 1.
List of Sample Companies for 2019 – 2021 in LQ45 Stock Index

No	Code	Company name
1	AKRA	AKR Corporindo Tbk.
2	ANTM	Aneka Tambang Tbk.
3	ASII	Astra International Tbk.
4	BSDE	Bumi Serpong Damai Tbk.
5	EXCL	XL Axiata Tbk.
6	GGRM	Gudang Garam Tbk.
7	HMSP	H.M. Sampoerna Tbk.
8	ICBP	Indofood CBP Sukses Makmur Tbk.
9	INDF	Indofood Sukses Makmur Tbk.
10	INTP	Indocement Tunggal Prakarsa Tbk.
11	JSMR	Jasa Marga (Persero) Tbk.
12	KLBF	Kalbe Farma Tbk.
13	MNCN	Media Nusantara Citra Tbk.
14	PTBA	Bukit Asam Tbk.
15	PTPP	PP (Persero) Tbk.
16	SMGR	Semen Indonesia (Persero).
17	TLKM	Telekomunikasi Indonesia (Persero) Tbk.
18	UNTR	United Tractors Tbk.
19	UNVR	Unilever Indonesia Tbk.
20	WIKA	Wijaya Karya (Persero) Tbk.

Source: www.idx.co.id (processed)

Data analysis technique

The stages of data analysis carried out are:
1. Obtain the necessary data, namely financial statements in rupiah currency (already processed) which are included in the LQ45 index for 3 years, namely 2019 – 2021.
2. Calculating financial ratios
   Calculates the modified Altman Z-Score model value from known financial ratios. The formula is: $Z'' = 6{,}56\ X1 + 3{,}26\ X2 + 6{,}72\ X3 + 1{,}05\ X4$
   Where:
   X1 = (Current Assets – Current Liabilities) : Total Assets
   X2 = Retained earning: Total Assets
   X3 = Profit Before Interest and Tax: Total Assets
   X4 = Book Value of Common Stock and Preferred Stock: Book Value Total Debt
3. Doing interpretation.
   interpretation:
   1. If the value of $Z'' < 1{,}1$: Bankrupt.
   2. $1{,}1 < Z'' < 2{,}6$: *Grey area.*
   3. $Z'' > 2{,}6$: Healthy.
4. Concluding on of company bankruptcy from the results of data analysis obtained.

RESULTS AND DISCUSSION
Modified Altman Z-Score Model Bankruptcy Prediction

Table 2.
Value Calculation Method Altman Z-Score Modified Company Index LQ45
Tahun 2019 – 2021

No	Code	Year	X1	X2	X3	X4	Z-Score	Prediction
1	AKRA	2019	0.096	0.299	0.035	0.888	2.776	Healthy
		2020	0.157	0.371	0.062	1.299	4.019	Healthy
		2021	0.116	0.320	0.059	0.925	3.166	Healthy
2	ANTM	2019	0.079	0.246	0.015	1.503	2.997	Healthy
		2020	0.050	0.262	0.034	1.500	2.987	Healthy
		2021	0.157	0.297	0.082	1.725	4.359	Healthy
3	ASII	2019	0.083	0.398	0.084	1.131	3.593	Healthy
		2020	0.138	0.440	0.054	1.369	4.138	Healthy
		2021	0.154	0.445	0.082	1.421	4.501	Healthy
4	BSDE	2019	0.332	0.390	0.039	1.605	5.400	Healthy
		2020	0.269	0.345	-0.021	1.306	4.122	Healthy
		2021	0.284	0.364	-0.002	1.403	4.510	Healthy
5	EXCL	2019	-0.226	0.093	-0.018	0.439	-0.833	Bankrupt
		2020	-0.167	0.088	-0.037	0.394	-0.642	Bankrupt
		2021	-0.182	0.095	-0.009	0.381	-0.543	Bankrupt
6	GGRM	2019	0.341	0.633	0.177	1.838	7.417	Healthy
		2020	0.416	0.733	0.119	2.975	9.041	Healthy
		2021	0.344	0.646	0.080	1.933	6.930	Healthy

7	HMSP	2019	0.569	0.274	0.358	2.344	9.490	Healthy
		2020	0.490	0.171	0.224	1.556	6.909	Healthy
		2021	0.365	0.139	0.171	1.221	5.279	Healthy
8	ICBP	2019	0.260	0.477	0.188	2.216	6.849	Healthy
		2020	0.111	0.217	0.090	0.945	3.034	Healthy
		2021	0.128	0.228	0.067	0.864	2.942	Healthy
9	INDF	2019	0.070	0.277	0.073	1.291	3.207	Healthy
		2020	0.064	0.190	0.065	0.942	2.463	*Grey Area*
		2021	0.077	0.205	0.065	0.934	2.586	*Grey Area*
10	INTP	2019	0.323	0.661	0.082	4.988	10.061	Healthy
		2020	0.296	0.630	0.077	4.291	9.015	Healthy
		2021	0.256	0.661	0.084	3.739	8.325	Healthy
11	JSMR	2019	-0.300	0.009	0.007	0.303	-1.576	Bankrupt
		2020	-0.041	0.030	-0.028	0.312	-0.032	Bankrupt
		2021	-0.016	0.046	-0.024	0.337	0.235	Bankrupt
12	KLBF	2019	0.427	0.747	0.166	4.694	11.277	Healthy
		2020	0.439	0.737	0.157	4.262	10.808	Healthy
		2021	0.474	0.720	0.159	4.832	11.602	Healthy
13	MNCN	2019	0.308	0.599	0.140	2.358	7.394	Healthy
		2020	0.325	0.657	0.101	3.242	8.361	Healthy
		2021	0.311	0.686	0.138	4.550	9.979	Healthy
14	PTBA	2019	0.268	0.127	0.204	2.400	6.064	Healthy
		2020	0.187	0.074	0.129	2.380	4.832	Healthy
		2021	0.297	0.232	0.282	2.043	6.745	Healthy
15	PTPP	2019	0.190	0.016	0.008	0.414	1.781	*Grey Area*
		2020	0.111	0.002	-0.003	0.355	1.092	Bankrupt
		2021	0.065	0.005	-0.007	0.347	0.758	Bankrupt
16	SMGR	2019	0.055	0.370	0.000	0.738	2.343	*Grey Area*
		2020	0.052	0.407	0.015	0.842	2.654	Healthy
		2021	0.014	0.427	0.024	1.083	2.783	Healthy
17	TLKM	2019	-0.075	0.344	0.152	1.128	2.836	Healthy
		2020	-0.091	0.321	0.139	0.959	2.384	*Grey Area*
		2021	-0.028	0.322	0.142	1.103	2.975	Healthy
18	UNTR	2019	0.163	0.420	0.118	1.208	4.498	Healthy
		2020	0.233	0.494	0.055	1.723	5.316	Healthy
		2021	0.268	0.502	0.122	1.763	6.061	Healthy
19	UNVR	2019	-0.220	0.247	0.468	0.344	2.872	Healthy
		2020	-0.221	0.231	0.436	0.317	2.571	*Grey Area*
		2021	-0.252	0.217	0.383	0.293	1.939	*Grey Area*
20	WIKA	2019	0.193	0.075	0.031	0.448	2.186	*Grey Area*
		2020	0.056	0.000	-0.013	0.324	0.618	Bankrupt
		2021	0.003	0.001	-0.014	0.336	0.284	Bankrupt
2019		Healthy		15			75%	
		Grey Area		3			15%	
		Bankrupt		2			10%	
		Amount		20			100%	

2020	Healthy	13	65%
	Grey Area	3	15%
	Bankrupt	4	20%
	Amount	20	100%
2021	Healthy	14	70%
	Grey Area	2	10%
	Bankrupt	4	20%
	Amount	20	100%

Source: Financial Report (processed)

The conclusion is that in 2019-2021 20 companies are constant in the LQ45 index. In 2019 there were 15 companies (75%), gray area 3 (15%), and 2 (10%). In 2020, there are 13 companies in the healthy category (65%), the gray area category with 3 companies (15%), and 4 companies with potential bankruptcy (20%). In 2021, there will be 14 companies in the healthy category (70%), in the gray area category with 2 companies (10%), and 4 companies with potential bankruptcy (20%).

The details are as follows:
1. Healthy
   There are 12 healthy companies in 2019-2021: AKRA, ANTM, ASII, BSDE, GGRM, HMSP, ICBP, INTP, KLBF, MNCN, PTBA, and UNTR. The year 2019: INDF, TLKM, and UNThe year year 2020: SMGR. 2021: SMGR and TLKM.
   The company is in a healthy condition because it is considered capable of carrying out operational activities properly.
2. *Grey Area*/ Prone to Bankruptcy
   There are 3 companies that are prone to bankruptcy in 2019: PTPP, SMGR, and WIKA. In 2020 as many as 3 companies: INDF, TLKM, and UNVR. In 2021 as many as 2 companies: INDF and UNVR.
3. Bankrupt
   There were 2 companies that went bankrupt in 2019: EXCL and JSMR. In 2020 – 2021 as many as 4 companies: EXCL, JSMR, PTPP, and WIKA.

Prediction Results of Company Bankruptcy including LQ45 Index

Table 3
Altman Company Bankruptcy Prediction Included in LQ45 2019 – 2021

No	Kode	Z-Score		
		2019	**2020**	**2021**
1	AKRA	Healthy	Healthy	Healthy
2	ANTM	Healthy	Healthy	Healthy
3	ASII	Healthy	Healthy	Healthy
4	BSDE	Healthy	Healthy	Healthy

5	EXCL	Bankrupt	Bankrupt	Bankrupt
6	GGRM	Healthy	Healthy	Healthy
7	HMSP	Healthy	Healthy	Healthy
8	ICBP	Healthy	Healthy	Healthy
9	INDF	Healthy	*Grey Area*	*Grey Area*
10	INTP	Healthy	Healthy	Healthy
11	JSMR	Bankrupt	Bankrupt	Bankrupt
12	KLBF	Healthy	Healthy	Healthy
13	MNCN	Healthy	Healthy	Healthy
14	PTBA	Healthy	Healthy	Healthy
15	PTPP	*Grey Area*	Bankrupt	Bankrupt
16	SMGR	*Grey Area*	Healthy	Healthy
17	TLKM	Healthy	*Grey Area*	Sehat
18	UNTR	Healthy	Healthy	Healthy
19	UNVR	Healthy	*Grey Area*	*Grey Area*
20	WIKA	*Grey Area*	Bankrupt	Bankrupt
Healthy		15	13	14
Grey Area		3	3	2
Bankrupt		2	4	4

Source: Financial Report (processed)

In 2019 there were 15 healthy companies, 3 gray areas prone to 3 companies, and 2 potential bankrupt companies. In 2020, there are 13 healthy companies, 3 vulnerable companies, and 4 companies with the potential to go bankrupt. In 2021, there are 14 healthy companies, 2 vulnerable companies, and 4 companies with the potential to go bankrupt.

CONCLUSIONS AND RECOMMENDATIONS

In 2019, there were 15 companies in the healthy category, 3 companies in gray area or prone to bankruptcy, and 2 companies with the potential to go bankrupt. In 2020, which includes the healthy category of 13 companies, gray area or prone to 3 companies, and the potential for bankruptcy of 4 companies. In 2021, which includes 14 companies in the healthy category, gray area or prone to 2 companies, and 4 companies have the potential to go bankrupt. From this research, can be used as additional information to analyze decision-making in investment portfolios into healthy companies and can be additional information to take further actions regarding the condition of the company. In addition, for the company to pay more attention to its financial ratios to avoid the risk of bankruptcy. The results of this study can be used as a reference.

The limitations of this study are; number of samples and limited period only years 2019 – 2021; using only the Altman Z-Score bankruptcy prediction tool, and

using a sample for 3 years and the financial statement data using the rupiah currency in reporting.

Suggestions for companies, investors, and further researchers, that is companies that are in the healthy category can maintain internal and external conditions and companies that are predicted to be vulnerable or bankrupt need to improve their performance and immediately take corrective or preventive actions. Investors before making investment decisions can use information about financial ratio analysis with predictions of bankruptcy, to minimize risk. It is better to invest in companies with healthy categories, and if you invest in companies in the vulnerable or bankrupt category, you should analyze the fairness of the stock prices offered. Further researchers, can add analytical tools, in addition to the Altman model and add a research period so that research results become more optimal.

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