BANKRUPTCY PREDICTION OF LISTED CEMENT COMPANY IN INDONESIAN STOCK EXCHANGES USING ALTMAN Z-SCORE MODEL

Arifia Fitriani1, Alizar Hasan2, Ahmad Syafruddin Indrapriyatna3

1Industrial Engineering Department, Faculty of Engineering, Andalas University

2Lecturer of Industrial Engineering Department, Faculty of Engineering, Andalas University

3Lecturer of Industrial Engineering Department, Faculty of Engineering, Andalas University

e-mail: arifiafitriani@gmail.com

**Abstract**

*Ratio analysis is one of the most competent tools to predict the bankruptcy of a company. In this paper the bankruptcy prediction of listed cement company in Indonesian Stock Exchanges has been evaluated using Altman Z-score. This study aims to determine the level of the bankruptcy of the listed cement companies in the Indonesian Stock Exchange during 2013 to 2017. There are four listed cement companies, namely PT Semen Indonesia Tbk. (SMGR), PT Semen Baturaja Tbk. (SMBR), PT Indocement Tunggal Prakarsa Tbk. (INTP) and PT Holcim Indonesia Tbk. (SMCB). Based on the results of the research, it shows that PT Semen Indonesia Tbk. (SMGR), PT Semen Baturaja Tbk. (SMBR) and PT Indocement Tunggal Prakarsa Tbk. (INTP) are in the safe zone with the highest Z value which is 15,822 and the lowest Z value which is 3,542. PT Holcim Indonesia Tbk. (SMCB) is in the bankrupt zone because it has a Z value below 1.8. For that reason, all companies need to improve the performance immediately to avoid the bankruptcy happening. There are many ways to avoid the bankruptcy such as improving the sales revenue, improving operational cost and waste reduction in operation.*

Key words: Altman Z-score, bankruptcy, ratio analysis

**Abstrak**

Analisis rasio adalah salah satu alat paling kompeten untuk memprediksi kebangkrutan perusahaan. Dalam tulisan ini prediksi kebangkrutan perusahaan semen yang terdaftar di Bursa Efek Indonesia dievaluasi menggunakan Altman Z-score. Penelitian ini bertujuan untuk mengetahui tingkat kebangkrutan perusahaan semen yang terdaftar di Bursa Efek Indonesia selama 2013 hingga 2017. Ada empat perusahaan semen yang terdaftar, yaitu PT Semen Indonesia Tbk. (SMGR), PT Semen Baturaja Tbk. (SMBR), PT Indocement Tunggal Prakarsa Tbk. (INTP) dan PT Holcim Indonesia Tbk. (SMCB). Berdasarkan hasil penelitian, terlihat bahwa PT Semen Indonesia Tbk. (SMGR), PT Semen Baturaja Tbk. (SMBR) dan PT Indocement Tunggal Prakarsa Tbk. (INTP) berada di zona aman dengan nilai Z tertinggi yaitu 15.822 dan nilai Z terendah yaitu 3.542. PT Holcim Indonesia Tbk. (SMCB) berada di zona bangkrut karena memiliki nilai Z di bawah 1,8. Oleh karena itu, semua perusahaan perlu segera meningkatkan kinerja untuk menghindari kebangkrutan yang terjadi. Ada banyak cara untuk menghindari kebangkrutan seperti meningkatkan pendapatan penjualan, meningkatkan biaya operasional dan pengurangan limbah dalam operasi.

**Kata kunci:** Altman Z-score, analisis rasio, kebangkrutan

INTRODUCTION

*Background Of The Study*

 Predicting the financial health or corporate bankruptcy can be done by various methods. Ratio analysis is one of the most competent tools to predict the bankruptcy of a company, but the best method in predicting corporate bankruptcy is the Altman Z score method. The study conducted by Altman (2006) used financial ratios predicting corporate health with a 94% accuracy rate for one year before bankruptcy occurs; and 72% two years before the actual incident, while in a series of tests that have been conducted the next Altman was covering three different time periods, until 1999, accuracy in predicting bankruptcy one year ahead, ranging between 80-90% (Altman, 2006).

In 2012, the number of cement producers in Indonesia was only nine companies, but until 2018 the number of cement companies has reached 19 companies. A large number of newcomers has impacted the increasing of national cement production capacity. Throughout 2016, the production capacity of cement has penetrated 95.5 million tons, while domestic and export demand is only 63.5 million tons. When comparing 2014 data, the capacity of the cement plant is still 69.5 million tons; there is an increase of 26 million tons or an increase of 38%. Based on data from the Indonesian Cement Association (ASI), domestic cement sales in October 2017 reached 6.8 million tons, up only 11.4% from the same period last year. Cumulatively, the total national cement sales during January-October 2017 reached 54.19 million tons, an increase of only 7.3% compared to the same period last year (Indonesian Cement Association).

In general, the performance of cement companies' revenue in the period of January-September 2017 is still sluggish. Only Cement Indonesia posted a 7.69% increase from the previous year, while Semen Baturaja, Semen Indocement Tunggal Prakarsa, and Semen Holcim still have not published the latest financial report (Indonesian Cement Association). As of September 30, 2017, the biggest contributor to Semen Indonesia's revenue is still dominated by cement sales, worth Rp17.55 trillion, or 85% of total revenue. The revenue increase was not driven by cement sales, as cement sales from Semen Indonesia dropped 2% from the same period last year valued at Rp17.86 trillion. When income rose, the company's net profit decreased only Rp1.45 trillion, down by 50%. The decline in net income was due to a 26% increase in operating expenses to Rp14.5 trillion (Indonesian Cement Association). If left unchecked, it could endanger the company's survival. For that writer feel the need to research to know the health of a cement company which goes public in Bursa Efek Indonesia to avoid the situation that endangersthe company. By evaluating the health of the company, the manager can take action to avoid corporate bankruptcy.

*Research Questions*

Research question in this paper is to understand the level of the bankruptcy of listed cement companies in Indonesian Stock Exchange?

*The objective of The Study*

The goal to be achieved in this paper is to understand the level of the bankruptcy of the listed cement companies in Indonesia Stock Exchange.

LITERATURE REVIEW

The z-score analysis is a tool/method be used to predict the condition of the company whether in a healthy state or not and also shows the company's performance as well as reflect the prospects of the company in the future. Altman (1968) researched to develop new models to predict corporate bankruptcy. The model is known as the Z score model developed first by Edward Altman, professor of Finance, Stern Business School, University of New York, to evaluate the financial health of an enterprise by various ratios.

The Altman model has changed several times to create the last model whose formula uses five financial ratios to predict the bankruptcy of a company (Kumari, 2013). Multiple discriminant analysis is used to test the five financial ratios in predicting bankruptcy. The five financial ratios are working capital to total assets, retained earnings to total assets, earnings before interests’ taxes to total assets, the market value of equity to book value of total debts, and sales to total assets. Altman also found that certain ratios, especially liquidity and leverage, contributed the most in detecting and predicting corporate bankruptcy.

Z Score Bankruptcy Model:

 Z = 1,2X1 + 1,4X2 + 3,3X3 + 0,6X4 + 1,0X5 (1)

where:

X1 = Working Capital to Total Asset

X2 = Retained Earnings to Total Assets

X3 = Earnings Before Interest and Taxes to Total Assets

X4 = Market Value Of Equity to Book Value Of Liabilities

X5 = Sales to Total Assets

Zones of Discrimination

1. Z < 1,8if a firm got a Z value of less than 1,8 it is consideredthat the firm to be in the **distress zone.**
2. 1,8 < Z < 3,0 if a firm got a value of anything in between 1.8 and 3,0 indicates that the firm is at the risk of financialdistress or it considered in the **grey zone.**
3. Z > 3,0 if a firm got a Z value of greater than 3,0 it can be concluded that the firm is in a **safe zone.**

RESEARCH METHODOLOGY

 The sample in this study is the company in the cement sector which listed on the Indonesia Stock Exchange. There are four listed cement companies, from government and private. PT Semen Indonesia Tbk. And PT Semen BaturajaTbk are they belong to the government and the private companies are PT Indocement Tunggal Prakarsa Tbk. And PT Holcim Indonesia Tbk. This study uses secondary data obtained from Indonesian Capital Market Directory (ICMD) and the annual report of the company (financial statements).

The data had been analyzedthrough Altman’s Z score model, for which a few ratios have been calculated through ratio analysis and collected data is analyzed by using Excel. The ratios are the widely used tool to measure the financial performance of a company. There are four major ratios which define the complete financial position of a company, which is a liquidity ratio, profitability ratio, solvency ratio,and activity ratio. The liquidity ratio helps to measure the company’s ability to meet the short-term obligations. The profitability ratio measures the profit-bearing capacity of a company. The solvency ratio measures the debt service capacity in the long run and the activity ratio determines the company’s ability to utilize the assets efficiently. In the above formula, X1 gives the liquidity position to the total capitalization, X2 measures the cumulative profitability overtime and leverages, X3 measures the operating performance and productivity of assets, X4 gives the long-term solvency position and X5 gives the sales generating capacity of the assets.

Table 1. Selected Cement Company

|  |
| --- |
| NoName of The CompanySymbol |
| 1. PT Semen Indonesia Tbk. SMGR2.PT Semen Baturaja Tbk. SMBR3.PT Indocement Tunggal Prakarsa Tbk. INTP4.PT Holcim Indonesia Tbk. SMCB |

**RESULTS AND DISCUSSION**

Table 2. Value of **SMGR** Z Score Indicators

|  |  |
| --- | --- |
|   | **SMGR** |
|  |  **2013 2014 2015 2016 2017** |
| Working capital 4674479 6376615 3939514 2221486 4998242 |
| Total assets 30792884 34331675 34331675 44226896 48963503 |
| **X1 0.152 0.186 0.115 0.050 0.102** |
| Retained earnings 19752566 22953520 25389389 26527985 26733361 |
| **X2 0.641 0.669 0.740 0.600 0.546** |
| Ebit 6920400 7077276 5850923 5084622 2746546 |
| **X3 0.225 0.206 0.170 0.115 0.056** |
| Book value of equity 83931008 96090624 67619328 54421696 58722048 |
| Book value of debt 9081621 9326745 10712321 13652504 18524451 |
| **X4 9.242 10.303 6.312 3.986 3.170** |
| Net sales 24501241 26987035 26948004 26134306 27813664 |
| **X5 0.796 0.786 0.785 0.591 0.568** |

 The ratio of net working capital to total assets depicts the liquidity position of the company. The ratio of working capital to the total assets of the firm varies from 0.050 to 0.186 during the study period; there is no upward or downward tendency based on X1 value. It shows that inefficient working capital mobilization seen from fluctuating X1 value. The ratio of retained earnings to total assets is varied from 0,546 to 0,740 during the study period, it indicating that the retained earnings mobilization is low. The ratio of EBIT to total assets is positive and low and varied from 0,546 to 0.74 shows that the earnings of the company are low. The book value of equity to debt is a common indicator of bankruptcy. It is a measure which indicates how much the company's assets can decline in value before the liabilities exceed the assets and the company becomes insolvent. From the analysis, it can be concluded that SMGR is relying more on equity rather than debt. The sales to total assets ratio are varied from 0,591 to 0,796 during the study period indicating that the sales of the company are low compared to the total assets invested by the company. Overall, the solvency position of the company is good enough, but the company must be able to make decisions wisely so that the company's financial performance does not continue to decline every year.

Table 3. Value of **SMBR** Z Score Indicators

|  |  |
| --- | --- |
|   | **SMBR** |
|  **2013 2014 2015 2016 2017** |
| Working capital 1913010 2156020 1703873 545994 454774 |
| Total assets 2711416 2928480 3268668 4368877 5060337 |
| **X1 0.706 0.736 0.521 0.125 0.090** |
| Retained earnings 449157 665292 931553 1135543 1217417 |
| **X2 0.166 0.227 0.285 0.260 0.241** |
| Ebit 400402 404810 443414 349281 208947 |
| **X3 0.148 0.138 0.136 0.080 0.041** |
| Book value of equity 3246434 3748156 2862764 27447123 32976000 |
| Book value of debt 244459 245389 319315 1248119 1647477 |
| **X4 13.280 15.274 8.965 21.991 20.016** |
| Net sales 1168608 1214915 1214915 1522808 1551525 |
| **X5 0.431 0.415 0.372 0.349 0.307** |

 The ratio of working capital to total company assets varies from 0.090 to 0.736 during the study period. High level of fluctuation indicates that SMBR has a good level of investment in current assets. The ratio of retained earnings to total assets is varied from 0.166 to 0.285 during the study period, indicating that the mobilization of retained earnings is good because the trend of retained earnings rises every year. The ratio of EBIT to total assets is positive and low and varied from 0.041 to 0.148 shows that the earnings of the company are low. The ratio of book value of equity and book value of debt ratio ranges from 8,965 to 21,991. From the analysis, it can be concluded that SMBR is relying more on equity rather than debt. The sales to total asset ratio is varied from 0.307 to 0.431 during the study period indicating that the sales of the company is low compared to total assets invested by the company. Overall, the solvency position of the company is not poor.

Table 4. Value of **INTP** Z Score Indicators

|  |  |
| --- | --- |
|   | **INTP** |
|  **2013 2014 2015 2016 2017** |
| Working capital 14106159 12826811 10446111 11237000 9404000 |
| Total assets 26607241 28884635 27638360 30151000 28864000 |
| **X1 0.530 0.444 0.378 0.373 0.326** |
| Retained earnings 18438208 20037534 19326471 21883459 20323413 |
| **X2 0.693 0.694 0.699 0.726 0.704** |
| Ebit 6595154 6815478 5645111 4146379 2287989 |
| **X3 0.248 0.236 0.204 0.138 0.079** |
| Book value of equity 73624634 92030792 82183498 56691000 80803040 |
| Book value of debt 3629554 4307622 3772410 4012000 4307000 |
| **X4 20.285 21.365 21.785 14.130 18.761** |
| Net sales 18691286 19996264 17798055 15362000 14431000 |
| **X5 0.702 0.692 0.644 0.510 0.500** |

 The ratio of working capital to the total assets of the firm varied from 0.326 to 0.530 during the study period. It indicates that SMBR has a good level of investment in current assets. The ratio of retained earnings to total assets is varied from 0.693 to 0.726 during the study period, indicating that the mobilization of the retained earnings is good because of the tendency of retained earnings that tend to rise. The ratio of EBIT to total assets is positive and always decreases annually and varied from 0.079 to 0.248 shows that the earnings of the company are low. The ratio of book value of equity and book value of debt ratio ranges from 14,130 to 21,785. From the analysis, it can be concluded that INTP is relying more on equity rather than debt. The sales to total assets ratio are varied from 0,500 to 0.702 indicating that every year the company's sales continue to decline so that the company must make efforts to resell the sales increase. Overall, the solvency position of the company is not poor.

Table 5. Value of Z **SMCB** Score Indicators

|  |  |
| --- | --- |
|   | **SMCB** |
| **2013 2014 2015 2016 2017** |
| Working capital -1176999 -1541356 -1375667 -2844408 -2457792 |
| Total assets 14894990 92030792 17321565 19763133 19626403 |
| **X1 -0.079 -0.017 -0.079 -0.144 -0.125** |
| Retained earnings 2469116 2278138 2031098 1829331 1071286 |
| **X2 0.166 0.025 0.117 0.093 0.055** |
| Ebit 1336548 928746 350418 172032 690455 |
| **X3 0.090 0.010 0.020 0.009 0.035** |
| Book value of equity 17433098 16743437 7624586 6897000 6399000 |
| Book value of debt 6122043 8617335 8871708 11702538 12429452 |
| **X4 2.848 1.943 0.859 0.589 0.515** |
| Net sales 9686262 9483612 9239022 9458403 9382120 |
| **X5 0.650 0.103 0.533 0.479 0.478** |

 The ratio of working capital to total assets has a negative value during the study period. It indicates that SMBR has a bad level of investment in current assets. The ratio of retained earnings to total assets is varied from 0.025 to 0.166 during the study period, indicating that the retained earnings are not poor. The ratio of EBIT to total assets is positive and low and varied from 0.009 to 0.090 shows that the earnings of the company are low. The ratio of book value of equity and book value of debt ratio ranges from 0,515 to 2,858. It shows the interest of shareholders is low due to the ill financial health of the company. The sales to total assets ratio are varied from 0.103 to 0.650 during the study period indicating that the sales of the company are low compared to the total assets invested by the company. Overall, the solvency position of the company is not good.

Table 6. Value of Coefficients and Z Score

|  |
| --- |
| **Z SCORE OF SMGR** |
| **YEAR 1,2X1 1,4X2 3,3X3 0,6X4 1,0X5 Z** |
| 2013 0.182 0.898 0.742 5.545 0.796 **8.163** |
| 2014 0.223 0.936 0.680 6.182 0.786 **8.807** |
| 2015 0.138 1.035 0.562 3.787 0.785 **6.308** |
| 2016 0.060 0.840 0.379 2.392 0.591 **4.262** |
| 2017 0.122 0.764 0.185 1.902 0.568 **3.542** |
| **Z SCORE OF SMBR** |
| **YEAR 1,2X1 1,4X2 3,3X3 0,6X4 1,0X5 Z** |
| 2013 0.847 0.232 0.4877 7.968 0.431 **9.965** |
| 2014 0.883 0.318 0.456 9.165 0.415 **11.237** |
| 2015 0.626 0.399 0.448 5.379 0.372 **7.223** |
| 2016 0.150 0.364 0.264 13.194 0.349 **14.321** |
| 2017 0.108 0.337 0.136 12.010 0.307 **12.897** |
| **Z SCORE OF INTP** |
| **YEAR 1,2X1 1,4X2 3,3X3 0,6X4 1,0X5 Z** |
| 2013 0.636 0.970 0.818 12.171 0.702 **15.298** |
| 2014 0.533 0.971 0.779 12.819 0.692 **15.794** |
| 2015 0.454 0.979 0.674 13.071 0.644 **15.822** |
| 2016 0.447 1.016 0.454 8.478 0.510 **10.905** |
| 2017 0.391 0.986 0.262 11.257 0.500 **13.395** |
| **Z SCORE OF SMCB** |
| **YEAR 1,2X1 1,4X2 3,3X3 0,6X4 1,0X5 Z** |
| 2013 -0.095 0.232 0.296 1.709 0.650 **2.792**  |
| 2014 -0.020 0.035 0.033 1.166 0.103 **1.317** |
| 2015 -0.095 0.164 0.067 0.516 0.533 **1.185** |
| 2016 -0.173 0.130 0.029 0.354 0.479 **0.818** |
| 2017 -0.150 0.076 0.116 0.309 0.478 **0.829** |

Table 7. Z Value and Firm’s Classification

|  |
| --- |
| **COMPANY YEAR Z VALUE ZONE** |
| **SMGR** |  2013 8.163 **Safe zone** |
|  2014 8.807 **Safe zone** |
|  2015 6.308 **Safe zone** |
|  2016 4.262 **Safe zone** |
|  2017 3.542 **Safe zone** |
| **SMBR** |  2013 9.965 **Safe zone** |
|  2014 11.237 **Safe zone** |
|  2015 7.223 **Safe zone** |
|  2016 14.321 **Safe zone** |
|  2017 12.897 **Safe zone** |
| **INTP** |  2013 15.298 **Safe zone** |
|  2014 15.794 **Safe zone** |
|  2015 15.822 **Safe zone** |
|  2016 10.905 **Safe zone** |
|  2017 13.395 **Safe zone** |
| **SMCB** |  2013 2.792 **Grey zone** |
|  2014 1.317 **Distress zone** |
|  2015 1.185 **Distress zone** |
|  2016 0.818 **Distress zone** |
|  2017 0.829 **Distress zone** |

 Based on table 7, PT Semen Indonesia Tbk. in 2013-2017 has a financial performance is in a safe area. This can be seen from the value of Z which is above 3 or Z> 3.0. Although the value of Z PT Semen Indonesia Tbk. are in safe areas, but companies must remain cautious because every year the financial performance of the company continues to decline. It can be seen from the value of Z which tends to decrease every year.

 PT Semen Baturaja Tbk. in the year 2013-2017 also has financial performance in the safe area. This can be seen from the Z value greater than three. PT Semen Baturaja Tbk. has a fluctuating financial performance, as seen from the declining Z value in 2015, rising in 2016 and back down in 2017. Therefore, the company must take policy for the company's financial performance does not decrease again in the next year.

 PT Indocement Tunggal Perkasa Tbk. in the year 2013-2017 also has financial performance in the safe area. This can be seen from the value of Z which is above three. Until 2015, the financial performance of PT Indocement Tunggal Perkasa Tbk. continues to increase, but in 2016 the value of Z companies decreased until finally rose again in 2017. Therefore the company should strive to improve its performance so that the company Z value does not decrease again in the next year.

 PT. Holcim Indonesia Tbk. in 2014-2017 has a financial performance that is in the area of ​​bankruptcy and located in the gray area only in 2013. Based on the score Z, the performance of PT. Holcim Indonesia Tbk. continues to decline. It must be addressed by the company so that PT. Holcim Indonesia Tbk. can improve its performance so the company does not go bankrupt in the next year.

Figure 1. Graphical Presentation of Z Scores

 Figure 1 represents the Z score of SMGR, SMBR, INTP,and SMCB (from table 7) is compared to the lowest range (1.8) and the highest range (3) of Altman's Z,score model. It can be seen that SMGR, SMBR, INTP has a viable financial position, but the management of the company must be careful and remains in a safe zone. Based on figure 1, it can also be seen that SMCB is in a bankrupt zone. The company must immediately take quick actions avoiding the and having experienced for the bankruptcy in the future.

CONCLUSION AND SUGGESTION

*Conclusion*

 The bankruptcy level of the listed cement company in Indonesian stock exchange show that PT Semen Indonesia Tbk. financial performance level is in the safe zone with Z value more than 3, 3.542 to 8.807. PT Semen BaturajaTbk. financial performance level is the safe zone with Z value in between 7.233 to 14.321, PT Indocement Tunggal Perkasa Tbk. This cement company is also having the financial performance in the safe zone, with Z value 10.905 to 15.882. Compared to other cement companies, Indocementhas the highest Z value. It means this company is the best among the others. PT. Holcim Indonesia Tbk. It is showing that during the 2014 – 2017, the financial performance in the area of bankruptcy, and on the verge of bankruptcy in 2013. Z value is in between 0.818 – 2,792 which is very low compared to others. This company needs to improve the performance immediately to avoid the bankruptcy happening.

 There are many ways to avoid bankruptcy such as improving the sales revenue with the stronger sales team, improving operational cost by improving productivity and waste reduction in operation. Lastly, the most important thing is the leadership team have to come out with clear objectives and strategic action of how to get out from the bankruptcy zone.

*Suggestion*

All the companies need the elemental improvement on company performance and financial management. It will help company fitness level in stock exchange to avoid the indication of bankruptcy which will impact and share the value in the stock list of Indonesian exchange.

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