

Measuring Financial Soundness of Selected Cement Industries in Bangladesh

Sharifa Akter Nipa

Begum Rokeya University, Rangpur

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ABSTRACT

Financial stability is a current concern for the industries in Bangladesh because of the recent COVID-19 pandemic. Cement industries are important for the construction industry. In this study, the researcher attempted to figure out the financial soundness of the cement industries in Bangladesh by examining the Altman Z-score model. In this research, seven cement industries are considered which are listed in the stock market of Bangladesh. In the case of estimating this score, the author highlighted overall calculations including three basic pillars of finance- liquidity, profitability, and solvency ratios. The result suggested that out of seven industries, two were in a healthy zone whereas others were into bankruptcy with poor profitability, risky investing vs saving management, and macroeconomic pressure on the supply chain resulting in high and exporting-oriented raw material. This paper can give a brief overview of the financial condition of the cement industry and policymakers can find out ways to improve the overall situation through several stringent but practical policy taking.

INTRODUCTION

Financial soundness is a vital operation under the smoothness of the intermediation process in a financial system. It concretes trust in activity on finance and encourages the transfer of funds from savers to creative entities. It augments the savings and investment climate, supportive of the growth of the economy by nurturing industrialization, creating employment opportunities, and generating income. To estimate it, economists, financial experts, or even mathematicians face several hurdles (Gadanecz and Jayaram, 2008). Financial soundness has a significant role in creating a better image in the market. Investors invest in a company based on it. Lack of financial strength is a hindrance to financial performance. Financial soundness becomes a critical factor in analyzing a firm's growth and investments. (Damijan, 2018). The financial system is a web of diverse actors such as banks, hedge funds, mutual funds, and so on (Mertzanis, 2021). Some real examples for assessing the importance were literally drawn from previous crises such as the 2007-2008 financial crisis, the 1997 Asian financial crisis, and the recent COVID-19. These events tinted that explicit structures in financial institutions' balance sheets could harmfully impact the financial sector, leading to the initiation and persistence of financial crises, (Laeven and Valencia, 2012). Moreover, these crises exposed the vulnerability of financial institutions that could co-exist with seemingly robust macroeconomic conditions. Consequently, global emphasis has risen on the systematic and regular monitoring of both financial institutions' balance sheets and macroeconomic conditions as crucial policy considerations to combat these stresses. Based on the financial soundness of a company, its useful users can know the financial capacity of the firm. They can make an effective investment decision and decide whether they can be forwarded to invest in it or not. (Bergo, 2002). Since its independence, there has been a substantial change in the industry of cement as it shares tiny to larger shares not only in the national economy but also in the share market. In other words, it participates in more than 10% of the GDP, and this

impressive rate of GDP shows its massive growth (Shelbourne, 2020) It has experienced an estimated amount of 11.5 percent growth rate over the past decade. According to the information of the Bangladesh Cement Manufacturers Association (BCMA), in the span of 11 years from 2008 to 2018, the sector experienced a quadruple increase through proactive efforts of promising industrialists. Although 76 cement manufacturing companies were listed, the current operational sum stands at 42, comprising large, medium, and small-scale enterprises. Out of these, seven are publicly listed on the stock market. The collective annual effective capacity of these 42 plants is approximately 58 million tons, surpassing the demand of around 31 million tons. Notably, the cement industry is dominated by ten key players, including two multinational corporations, collectively holding about four-thirds of the total market share. Manufacturers and investors are interested in this sector due to the increase in real estate, rapid urbanization, and big infrastructure projects. However, the COVID-19 pandemic lockdown troubled the annual growth rate. In terms of market growth, supply, and sales, this pandemic affected the cement sector. Unavailability of necessary raw materials, peak demand miss, and interruption in mega government projects have slowed the growth rate to approximately 3 to 6 percent. The fast spread of coronavirus has had a significant influence on financial markets. The impact of the COVID-19 pandemic on the financial performance of different sectors was analyzed in various research papers. Worldwide only a few studies have been done on the cement sector's performance comparing pre-COVID and post-COVID situations.

CEMENT INDUSTRIES IN BANGLADESH

In this 21st century, the cement industry is the alternative way to construct a modern civilization by redefining old monuments and creating new brick-layered buildings for industry, housing, or even recreation purposes. Bangladesh started this journey in 1992 and now its production is surpassing its latest threshold point in robustness having analyzed the contemporary research on the last few decades. For successful evidence, some revolutionary and significant projects have been undertaken in these industries such as Padma Bridge, Metro Rail, Bangabandhu Sheikh Mujibur Rahman Tunnel, Dhaka-Chittagong Elevated Expressway, and Dhaka Elevated Expressway. Apart from these, scholars have enlightened majorly on credit-strength analysis to execute overall liquidity, profitability, or other financial metric tools. These growing nerves are possible for several reasons as studied by several scholars (Ershad et al., 2021; Hossain et al., 2020; Hossain and Alam, 2019; Hossain et al., 2014). Ershad et al., (2021) examined the financial performance analysis of four cement industries using annual reports from 2015 to 2019. They revealed that Heidelberg Cement Bangladesh Ltd (HCBL) confirmed a favorable position in most of the financial metrics but Meghna Cements generally attained the lowermost score. To exhibit the impact of energy management practices in cement industries, another research endeavored quantitative research by collecting information from twenty cement industries in Bangladesh (Hossain et al., 2020). They concluded that the cement industry in Bangladesh has a low level of energy efficiency and conservation practices. This study suggested also that this industry has to implement more energy-efficient technologies and practices in order to reduce energy consumption.

Research Question:

Is there any deviation in the financial performance of cement industries pre-COVID and during COVID?

This study will help investors to know the present status of cement industries in Bangladesh. Interested investors will be conscious of COVID-19 on the share market of the cement sector, which investors may face. Investors can get an idea about cement industries and what opportunities they can get. This paper will also be helpful for the policymakers of the stock market to consider the factors in taking initiatives to make an environment for the existing investors to have active participation and for the investors who are willing to invest in the stock market. This study will be useful for policymakers, investors, businessmen, development partners, and researchers.

Objectives of the Study

The main object of this study is to analyze the overall financial efficiency of the selected cement industries. Besides the main objective, the following specific purposes have been set:

1. To investigate the financial position of cement industries.
2. To assess the impact of COVID-19 on cement industries.

LITERATURE REVIEW

Mizan and Hossain (2014) evaluated the economic health of cement companies, and they completed their study based on secondary data from the annual reports of the concerned companies. Altman's z-score model has been used to assess the financial data. The study shows that Heidelberg cement and Confidence Cement, are financially profitable but others are not in a sound position. Researchers (2015) worked on the correlation between the profitability and working capital of selected cement companies. Ratio analysis has been done by following secondary data of that sample industries.

Mohammed (2016) used secondary sources of Cement Company from 2007 to 2014 to predict bankruptcy. Altman's Z-score model has been used as a reliable tool. Multiple discrimination analysis has been carried out to find out the desired results.

Naqvi (2016) investigated the financial health of the cement sector over a specific period. Different types of financial ratios have been used for the measurement of performance. The study found that all parameters except the leverage ratios have positive relationship with the dependent variable. The paper suggested that CAPM, MVA, and EVA have to be tested for better output. The financial soundness of cement companies has been investigated by using eight financial ratios, i.e., return on investment, return on equity, current ratio, cash ratio, total asset turnover, inventory turnover, collection period, and total assets. This report can benefit managers in making the right decision by informing them about market share and profitability (Daryanto, 2018).

This paper (2020) examines the impact of firm size, different ratios, and the real interest rate on the firm's productivity and GDP growth rate. 2000-2018 of listed cement companies has been used as a sample and shows whether these factors impact profitability or not. Five years of financial statement data has been collected to analyze the financial health of Oman Cement Company. Liquidity ratios, profitability ratios, operating ratios, management efficiency ratios, and financing ratios were analyzed to determine economic growth (Sarhan, Nairi & Muthuraman, 2021).

Hypothesis of the Study

H0: There is no significant deviation between the performances of the industries in pre-COVID years and during COVID years.

H1: There is a significant deviation between the performances of the industries in pre-COVID years and during COVID years.

RESEARCH METHODS

The study followed a quantitative methodology by collecting an estimated dataset from the annual reports of seven cement industries from 2017 to 2022. Moreover, a comprehensive data imputation was observed

through cross-referencing with consecutive years and observing information from the central bank. Altman’s z-score model and different ratio analyses of the financial dataset were carried out to measure the financial performance of these industries. To show whether the consequences of COVID on these industries’ financial health before COVID (2017 to 2018) ratios were compared with during COVID (2019 to 2022) ratios. Accomplishing these tasks, the researcher endeavored to address the basic statistics, graphical representation, ranking of variables, and pairwise mean comparison were covered by MS Excel and SPSS V25.0.

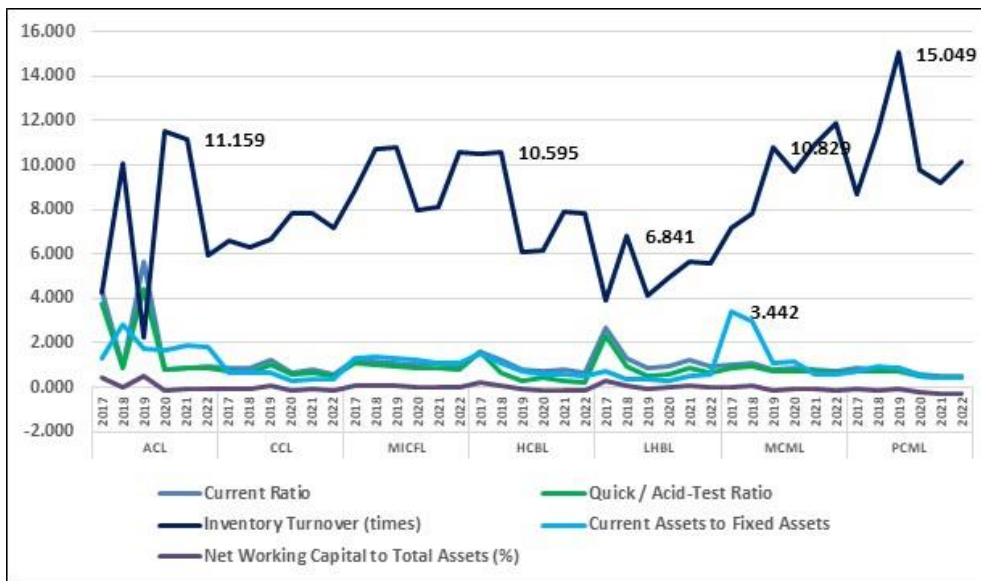
Liquidity Ratios

The liquidity ratio necessitates the fundamental part that reflects the financial stability of any organization. It is a crucial financial metric that deals with cash flow, and pay obligations at present, and further impacts directly or indirectly the profitability of any organization (Saleem and Rahman, 2011). In other words, it’s an initial indicator for testing the nerve of a company whether it is capable of generating cash for a shorter span to accomplish its obligations regardless of external hurdles such as borrowing loans from banks or else (Kisman and Dian, 2019; Sihombing et al., 2022). It acts in duality, on one side, it assembles cash and near-cash assets of a business while placing importance on drastic payment obligations. This study coincides with five tools that are crucial for measuring the liquidity ratio of any organization current ratio, quick or acid-test ratio, inventory turnover (times), current assets to fixed assets, and net working capital to total assets (%) respectively. The descriptive statistics of six fiscal years of seven cement industries in Bangladesh. The average of the current ratio and quick or acid-test ratio came to 1.154 and 0.925 percent respectively. The current ratio revealed a minimum of 0.5 for Premier Cement Mills Ltd. (PCML) in consecutive two years (2020 and 2021) due to the pandemic effect. On the other hand, the maximum was observed as 5.7 in 2019 on Aramit Cement Ltd (ACL) respectively. On the other hand, the lowest acid test ratio was observed in the recent year for Heidelberg Cement Bd Ltd (HCBL). Moreover, the central value for inventory turnover (times) is 8.273 as it dictates the seven industries are turning over their inventory about 8.273 times from 2017 to 2022. Net working capital to total assets is a metric for assessing information on short-term liquidity and financial strength. As its average is in the negative margin, so, the business is running in a bad period due to the risk of loss of financial liquidity. In other words, due to large cash payments decreasing current assets or a significant amount of credit extended in the form of accounts payable, it’s falling behind from zero. For addressing variability, the standard deviation was given as each ratio posited behind standard value except inventory turnover. Under the viewpoint of skewness and kurtosis, almost four ratios exhibited positively skewed and leptokurtic (or more values in the tails and fewer values close to the mean, and thus, a sharply peaked curve with heavy tails formed). These results are shown below in Table 01.

Table 01. Descriptive statistics of the liquidity ratio of seven cement industries in Bangladesh

| | Mean | Median | SD | Skewness | Kurtosis | Min. | Max. |
|--|---------|--------|-------|----------|----------|------|------|
| Current Ratio | 1.154 | 0.882 | 0.959 | 3.749 | 14.753 | 0.5 | 5.7 |
| Quick / Acid-Test Ratio | 0.925 | 0.729 | 0.802 | 3.365 | 12.039 | 0.2 | 4.4 |
| Inventory Turnover | 8.273 | 7.967 | 2.642 | 0.001 | -0.075 | 2.2 | 15 |
| Current Assets to Fixed Assets | 1.029 | 0.746 | 0.729 | 1.688 | 2.947 | 0.3 | 3.4 |
| Net Working Capital to Total Assets | - 0.017 | -0.057 | 0.160 | 1.483 | 3.358 | -0.3 | 0.5 |

Figure 01. Trend line of liquidity ratio of seven cement industries in Bangladesh



In Figure 01, the trend line of several indicators of liquidity ratio combined format was shown for seven industries from 2017 to 2022. The trend line of net working capital to total assets was quite lower as compared to other indicators as it positioned behind the other variables. Moreover, due to the lack of risk of excess liquidity, and thus pressured to reduce operating effectiveness, it faced negative values several times after or on the eve of the pandemic period. The movement of the current ratio and acid-test ratio was quite similar as both interlinked to each other. Inventory times spiked highest and it's clear that comparatively Premier Cement Mills Ltd (PCML) positioned the highest peak (15.05) in 2019. The trend plot of other variables was not so notable, or any drastic change was observed within the study period.

Profitability Ratio

In return on asset or capital stock, the health indicator of a financial institution is the profitability ratio (Mamduh and Abdul Halim, 2005; Satryo et al., 2017; Kisman and Dian, 2019). As the ratio increases, the chances of generating high profit upsurge. Under the profitability ratio, eight metrics were involved in this study of which a larger portion represents percentage value. The most popular tool in addressing profitability return on asset (ROA) and return on equity (ROE) was given as both represented meager chances of a positive average. Since the average of both ratios was quite far behind of standard (5%), it can be stated that the seven cement industries are in a hurdle in that they are earning low profitability with lower efficiency in generating incomes from assets. Another plausible reason was these organizations circulate with lower profit margins or need fundamental investments in assets to generate returns. Moreover, the average percentage of gross profit margin and net profit margin were 0.141 and 0.023 percent respectively. Both were quite poor indicating that the seven industries under study were not efficiently handling its costs associated with their pricing of products or services. In other words, all these industries, in general, were not capable of professionally rotating sales into profits by curbing costs and optimizing pricing. Moreover, earnings per share (EPS) revealed a low percentage as the average of EPS was 2.61 indicating that demonstrates earnings instability during the study period. Under minima and maxima, it's notable that each metric has faced a negative value regarding the performance of industries facing losses rather than profits. The minimum EPS was observed as -16.88 as faced by Aramit Cement Ltd. (ACL) in 2021. A similar shock was observed for the price-earnings ratio (P/E ratio) or a ratio that compares the current market price per share to the earnings per share (EPS) over a specific period which came to -1662.222 in 2020 for Heidelberg Cement Bd Ltd (HCBL). This sudden depression has happened probably for a temporary decline in earnings or a one-time loss that has significantly impacted the earnings per share (EPS). On the other hand, the maximum earnings per share (EPS) was observed at 15.86 for Confidence Cement Ltd (CCL) in 2021. On

the other hand, the price-earnings ratio (P/E ratio) was observed in 2017 for Lafaege Holcim Bd Ltd (LHBL) as it assured around 100. Apart from the central tendency, the dispersion was concerned with standard deviation (SD) as only earnings per share (EPS) and price-earnings ratio (P/E ratio) placed higher variability as compared to others due to their values being greater than the standard value (one). To explain about shape and form of the distribution, skewness, and kurtosis were provided. Out of eight financial tools, three metrics net profit margins, return to the asset (ROA), and price-earning ratio (P/E ratio) exhibited left-skewed. For more details, the results are shown in Table 02.

Table 02. Descriptive statistics of the profitability ratio of seven cement industries in Bangladesh

| | Mean | Median | SD | Skewness | Kurtosis | Min. | Max. |
|-------------------------------|---------|--------|---------|----------|----------|-----------|---------|
| Gross Profit Margin | 0.141 | 0.135 | 0.075 | 0.008 | 1.637 | -0.08 | 0.31 |
| Net Profit Margin | 0.023 | 0.030 | 0.147 | -4.127 | 23.357 | -0.79 | 0.27 |
| Total Asset Turnover | 0.873 | 0.748 | 0.470 | 0.540 | -0.723 | 0.11 | 1.9 |
| ROA | 0.036 | 0.021 | 0.076 | 2.193 | 6.815 | -0.08 | 0.34 |
| ROE | 0.009 | 0.061 | 0.267 | -3.888 | 17.402 | -1.34 | 0.31 |
| EPS | 2.610 | 2.820 | 6.065 | -0.651 | 2.230 | -16.88 | 15.86 |
| Operating Profit Ratio | 0.076 | 0.080 | 0.083 | -1.937 | 9.503 | -0.296 | 0.255 |
| P/E Ratio | -21.834 | 20.597 | 260.917 | -6.355 | 40.886 | -1662.222 | 100.791 |

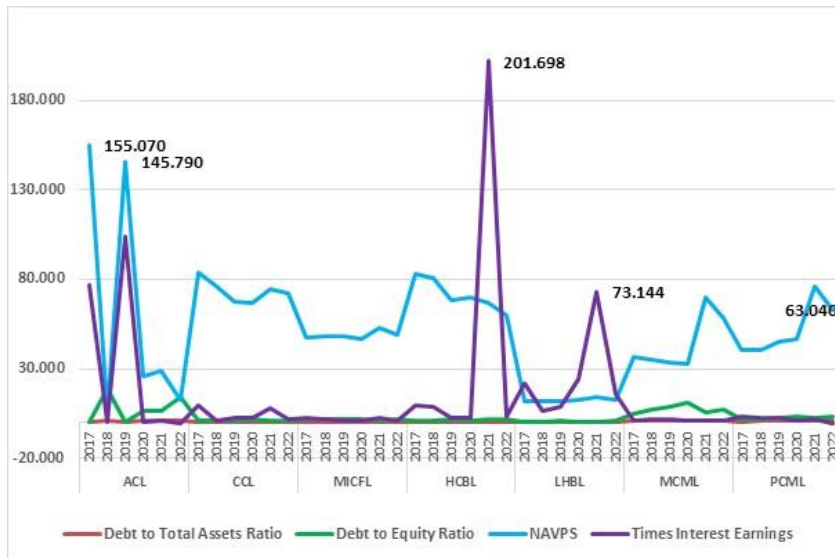
Solvency Ratio

These ratios are such kinds of financial indicators entangled with share market price as these values directly estimate the capacity of overall debt obligations captivating all its assets (Munawir, 2007; Satryo et al., 2016). In other words, these ratios are measurement or degree of which company assets are funded by debt (Baraja and Yosya, 2019). This study addressed four solvency ratios to check the overall nervousness of debt in internal and external factors. Firstly, the average debt to total assets ratio came to 0.612, which means these seven industries finance about 61 percent using their assets through debt and the rest by equity or shareholders. Similarly, the average debt-to-equity ratio (D/E ratio) of seven cement industries within six years was 3.202. In other words, these industries have funded 3.202 times more of their assets using debt than equity. As both the Debt to Total Assets Ratio and D/E ratio were higher, both strongly indicated that the sustainability of these seven industries was at risk as they were relying largely on debt finance. In other words, the financial circulation of these industries will be at stake, and borrowing in the future will be more unfortunate for them. Moreover, to check the ratio of asset value with shares, this study estimated net asset value per share (NAVPS) and the central value of this ratio came to 52.1 regarding each share of these industries was worth 52 based on the company’s assets and liabilities. To execute variability, standard deviation (SD) was shown and it observed that times interest earnings (TIE) came higher tendency of scatteredness as its standard deviation was almost four. Besides, except for the debt to total asset ratio, other variables had positively skewed. For more details, the result is shown in Table 03 .

Table 03. Descriptive statistics of the solvency ratio of seven cement industries in Bangladesh

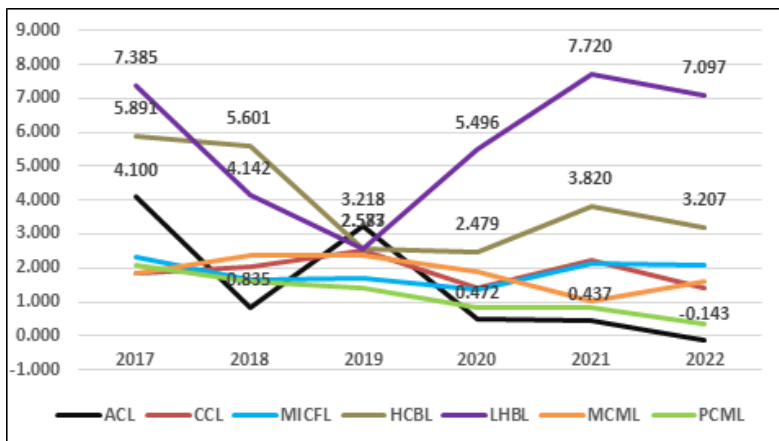
| | Mean | Median | SD | Skewness | Kurtosis | Min. | Max. |
|-----------------------------------|--------|--------|--------|----------|----------|--------|---------|
| Debt to Total Assets Ratio | 0.612 | 0.602 | 0.206 | -0.196 | -0.452 | 0.144 | 0.95 |
| Debt to Equity Ratio | 3.202 | 1.556 | 4.025 | 2.398 | 6.218 | 0.168 | 19.177 |
| NAVPS | 52.1 | 48.1 | 32.033 | 1.155 | 2.579 | 6 | 155.07 |
| Times Interest Earnings | 14.685 | 2.547 | 36.809 | 3.917 | 16.983 | -0.871 | 201.698 |

Figure 02. Trend line of solvency ratio of seven cement industries in Bangladesh



In the Figure 02, four solvency ratio tools were exhibited from 2017 to 2022 of seven cement industries in Bangladesh. The trend line for times interest earnings spiked higher as compared to other metrics and for Heidelberg Cement Bd Ltd (HCBL), these ups and downs were quite larger with respect to other organizations. For net asset value per share (NAVPS), the movement was quite parallel except for Aramit Cement Ltd (ACL) and Lafaeye Holcim Bd Ltd (LHBL). Lafaeye Holcim Bd Ltd (LHBL) holds quite lower values as compared to other industries. On the other hand, Aramit Cement Ltd (ACL) faced several hurdles as its NAVPS ratio was not consistent within the study period. In 2017, it held almost 155 NAVPS but within one year, it thrashed strongly and collected 6 points in 2018. The other two ratios debt to total assets ratio and debt to equity ratio (D/E ratio) exhibited similar patterns as their movement did not show any sudden booming or falling around six years.

Figure 03. Trend line of Altman’s Z-score of seven cement industries in Bangladesh



The final estimation of this study was the hindsight of financial soundness in terms of Altman’s Z-score was shown as a trend line of seven cement industries in Figure 03. There was erratic movement of this score for Aramit Cement Ltd (ACL), Lafaeye Holcim Bd Ltd (LHBL), and Heidelberg Cement Bd Ltd (HCBL) as these trio revealed quite ups and downs in respect to others. For example, Aramit Cement Ltd (ACL) scored 4.1 but subsequently, it slumped and scored only 0.835 on next year. Though it faced a downfall in 2018 afterward, it found a positive ray of hope as the score started at 3.218 in 2019 but ended at a negative horizon (-0.143). Heidelberg Cement Bd Ltd (HCBL) started its score with 5.891 in 2017 and it retard with

COVID-19 shock heavily as at or afterward, it roamed within two to three. Again, Lafaege Holcim Bd Ltd (LHBL) started with 7.385 as highest ever for the previous period but ended with 7.097 with a sharp shock of the pandemic hit. The remaining did not show any sudden fall or booming scenario as overall, the Z-score exhibited quite shocking as their score posited within the distress zone.

Table 04. Descriptive statistics of the Altman’s Z-score of seven cement industries in Bangladesh

| Name of Industries | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Mean | Industry Mean | SD | CV |
|--------------------|-------|-------|-------|-------|-------|-------|-------|---------------|-------|-------|
| ACL | 4.1 | 0.836 | 3.218 | 0.472 | 0.437 | 0.143 | 1.487 | 2.57 | 1.583 | 1.065 |
| CCL | 1.829 | 2.054 | 2.516 | 1.392 | 2.224 | 1.393 | 1.901 | 2.57 | 0.414 | 0.218 |
| MICFL | 2.333 | 1.672 | 1.686 | 1.351 | 2.135 | 2.069 | 1.874 | 2.57 | 0.333 | 0.178 |
| HCBL | 5.892 | 5.601 | 2.587 | 2.480 | 3.82 | 3.207 | 3.931 | 2.57 | 1.359 | 0.346 |
| LHBL | 7.385 | 4.142 | 2.573 | 5.496 | 7.72 | 7.097 | 5.735 | 2.57 | 1.876 | 0.327 |
| MCML | 1.857 | 2.356 | 2.388 | 1.903 | 1.004 | 1.582 | 1.848 | 2.57 | 0.472 | 0.255 |
| PCML | 2.064 | 1.617 | 1.421 | 0.829 | 0.849 | 0.341 | 1.187 | 2.57 | 0.572 | 0.482 |

Finally, the researcher estimated Altman’s Z-score, developed by Edward Altman to execute the financial soundness of seven industries from 2017 to 2022 (Altman, 1968; 2013). The overall estimation procedure is illustrated in Appendix (A2) and the result is given in Table 04. As per the scholar’s analysis for private manufacturing industries, this model is used to predict the chances of bankruptcy and it categorized the scale into three segments: The Z-core greater than or equal to 2.57 referred to as a safe zone, score posited between 1.1 to 2.6 referred to as grey zone and less than 1.1 was known as distress or risky zone. In other words, these three areas were known as low, moderate, and high risk of bankruptcy. Out of seven industries, only two industries Lafaege Holcim Bd Ltd (LHBL) and Heidelberg Cement Bd Ltd (HCBL) hold a safe position as their average as well as year-wise performance was quite better. Specifically, the average of Lafaege Holcim Bd Ltd (LHBL) and Heidelberg Cement Bd Ltd (HCBL) were 5.74 and 3.93 respectively as both ranged between 2.48 to 7.72 respectively. The performance of the rest of the industries was vulnerable as their average score dwindled behind 2. In more depth, Premier Cement Mills Ltd (PCML) and Aramit Cement Ltd (ACL) averages were worsened as their average Z-scores were 1.19 and 1.49 respectively. In fine, the overall industry average came to 2.57 which is slightly in the grey or moderately bankruptcy zone. Under the coefficient of variation (CV), the overall performance was judged for seven industries to examine whether they performed consistently in terms of bankruptcy over a six-year period. Out of seven industries, the lowest value was observed for M.I. Cement Factory Ltd (MICFL) as its CV value came to 0.178 while the highest was found on Aramit Cement Ltd (ACL). In the view of standard deviation, the variability was observed and it exhibited that Lafaege Holcim Bd Ltd (LHBDL), Aramit Cement Ltd (ACL), and Heidelberg Cement Bd Ltd (HCBL) showed the values 1.876, 1.583, and 1.359 respectively.

Ranking of variables of financial metrics among seven cement industries

To draw more attention to the industries, individual performance was calculated under firstly the average value of financial tools and then use their ascending order in representing their performance in a benchmark analysis. As the study mostly concentrated on the ratio of several financial tools, so, the average value of study variables was first prior. Then, using mode is the simplest idea to deduct the conclusion under three pillars of liquidity, profitability, and solvency for explaining the financial transaction in terms of simple ranking order. Concluding in light of mode, the liquidity ratio of the top three rankers were Aramit Cement Ltd (ACL), Lafaege Holcim Bd Ltd (LHBL), and M.I. Cement Factory Ltd (MICFL) respectively. Similarly, for profitability ratio, the first three performers were M.I. Cement Factory Ltd (MICFL), Meghna Cement Mills Ltd (MCML), and Aramit Cement Ltd (ACL) respectively. However, these pieces of evidence did not mean that their performance was good as the score rattled frequently, and deciding under ranking

order was tough due to the scuffling of financial tools in each indicator. In the ending stage, the Z-score performed well as posited in the safe zone for two industries only (Lafaege Holcim Bd Ltd (LHBL) and Heidelberg Cement Bd Ltd (HCBL). For more details, the result is shown in Appendix (A3).

Impact of COVID-19 on Seven cement industries’ financial soundness

To examine the COVID-19 effect, this study addressed a mean comparison test of all financial indicators by generating a dummy variable (2019 to on wards as and else as 0). The result is shown in Table 05. This comparison was analyzed into four dimensions. Firstly, in liquidity ratios, out of five ratios, four exhibited significant differences as their p-values were less than 0.05. In other words, the t-statistic of pre-COVID-19 current ratio, quick or acid-test ratio, current assets to fixed asset ratio, and net working capital to total assets ratio were 1.355, 1.663, 2.664, and 2.728 respectively. At or after COVID-19, these statistics stood at 0.814, 0.63, 0.79, and -0.096 respectively. So, out of these four metrics, only the net working capital to total assets ratio was shattered significantly due to the pandemic resulting in an imbalance in the supply chain mechanism and collection of raw materials from remote places. Secondly, the profitability performance of cement industries was not observed in any notable sign in previous descriptive analysis. This mean comparison also deducted similar findings as the mean did not differ between the two horizons of COVID-19. Thirdly, out of four solvency metrics, none exhibited a significant disparity of average value due to the pandemic. Fourthly and finally, scrutinizing the bankruptcy of seven cement industries, the Z-score was estimated and the average of the Z-score before and at or after the pandemic was 1.346 and 1.322 respectively. So, in fine, the financial indicators along with COVID-19 influence were not statistically significant as their previous performances in liquidity, profitability, and solvency were in poor condition, and due to the hegemony of these indicators, the sustainability and robust performance in the future is not to be easily explained.

Table 05. Mean comparison of examining COViD-19 effect of seven cement industries in Bangladesh

| Ratio | Variables | Label | Mean | Mean difference | t-statistic | p-value |
|-----------------|-------------------------------------|---------------|--------|-----------------|-------------|---------|
| Liquidity ratio | Current Ratio | Pre COVID-19 | 1.355 | 0.421 | 1.355 | 0.183 |
| | | Post COVID-19 | 1.333 | 0.421 | 1.333 | 0.194 |
| | Quick / Acid-Test Ratio | Pre COVID-19 | 1.663 | 0.428 | 1.663 | 0.104 |
| | | Post COVID-19 | 1.588 | 0.428 | 1.588 | 0.126 |
| | Inventory Turnover | Pre COVID-19 | -0.251 | -0.219 | -0.251 | 0.803 |
| | | Post COVID-19 | -0.263 | -0.219 | -0.263 | 0.794 |
| | Current Assets to Fixed Assets | Pre COVID-19 | 2.664 | 0.593 | 2.664 | 0.011 |
| | | Post COVID-19 | 2.173 | 0.593 | 2.173 | 0.045 |
| | Net Working Capital to Total Assets | Pre COVID-19 | 2.728 | 0.133 | 2.728 | 0.009 |
| | | Post COVID-19 | 2.67 | 0.133 | 2.67 | 0.013 |

| | | | | | | |
|----------------------------|-----------------------------------|----------------------|--------|--------|--------|-------|
| Profitability ratio | Gross Profit Margin | <i>Pre COVID-19</i> | 0.862 | 0.021 | 0.862 | 0.394 |
| | | <i>Post COVID-19</i> | 1.087 | 0.021 | 1.087 | 0.283 |
| | Net Profit Margin | <i>Pre COVID-19</i> | 0.663 | 0.032 | 0.663 | 0.511 |
| | | <i>Post COVID-19</i> | 0.885 | 0.032 | 0.885 | 0.382 |
| | Total Asset Turnover | <i>Pre COVID-19</i> | -0.315 | -0.049 | -0.315 | 0.754 |
| | | <i>Post COVID-19</i> | -0.36 | -0.049 | -0.36 | 0.721 |
| | ROA | <i>Pre COVID-19</i> | -0.004 | 0.000 | -0.004 | 0.997 |
| | | <i>Post COVID-19</i> | -0.006 | 0.000 | -0.006 | 0.996 |
| | ROE | <i>Pre COVID-19</i> | 0.309 | 0.027 | 0.309 | 0.759 |
| | | <i>Post COVID-19</i> | 0.332 | 0.027 | 0.332 | 0.742 |
| | EPS | <i>Pre COVID-19</i> | 1.943 | 3.733 | 1.943 | 0.059 |
| | | <i>Post COVID-19</i> | 2.073 | 3.733 | 2.073 | 0.047 |
| | Operating Profit Ratio | <i>Pre COVID-19</i> | 0.559 | 0.015 | 0.559 | 0.579 |
| | | <i>Post COVID-19</i> | 0.729 | 0.015 | 0.729 | 0.47 |
| P/E Ratio | <i>Pre COVID-19</i> | 0.868 | 74.373 | 0.868 | 0.39 | |
| | <i>Post COVID-19</i> | 1.23 | 74.373 | 1.23 | 0.229 | |
| Solvency ratio | Debt to Total Assets Ratio | <i>Pre COVID-19</i> | -1.016 | -0.068 | -1.016 | 0.316 |
| | | <i>Post COVID-19</i> | -0.969 | -0.068 | -0.969 | 0.343 |
| | Debt to Equity Ratio | <i>Pre COVID-19</i> | -0.154 | -0.205 | -0.154 | 0.878 |
| | | <i>Post COVID-19</i> | -0.137 | -0.205 | -0.137 | 0.892 |
| | NAVPS | <i>Pre COVID-19</i> | 0.283 | 2.997 | 0.283 | 0.779 |
| | | <i>Post COVID-19</i> | 0.254 | 2.997 | 0.254 | 0.802 |
| | Times Interest Earnings | <i>Pre COVID-19</i> | -0.522 | -6.346 | -0.522 | 0.605 |
| | | <i>Post COVID-19</i> | -0.653 | -6.346 | -0.653 | 0.517 |

| | | | | | | |
|------------------|---------|---------------|-------|-------|-------|-------|
| Altman's Z-score | Z-value | Pre COVID-19 | 1.346 | 0.837 | 1.346 | 0.186 |
| | | Post COVID-19 | 1.322 | 0.837 | 1.322 | 0.198 |

(sample size was 14 and 28 in both groups (Pre-COVID-19 and Post-COVID-19))

DISCUSSION

This study aimed to analyze the financial soundness of the seven cement industries of Bangladesh from the year 2017 to 2022 & to draw an influential decision regarding the impact of COVID-19. The financial soundness was retrieved under the NYU Professor Edward Altman's metric Altman's Z-score enlightening with financial metrics under liquidity, profitability, and solvency using in total of 15 variables. Through basic statistics, trend charts, and independent t-tests, this study enabled to sum of the soundness of running seven industries. Firstly, the liquidity ratio was addressed by measuring five metrics and it indicated that the two most popular metrics in this domain hold almost 1.15 and 0.925 on average for study institutions. Some plausible reasons behind this poorest performance are high dependence on inventory resulting in a balancing situation for meeting short-term liabilities, lowering sharemarket prices, scarcity in liquidity in facing hurdles on short-term obligations, or lack of observance in scrutinizing Benchmark analysis. Three more metrics also exhibited poor output resulting in the scenario of these seven industries indicating they are surviving in distress moments though their marketplace, reputation, and age of the firm were quite large. Secondly, the profitability ratio was defined in terms of revealing information on eight variables. Out of these eight variables, the three most popular metrics were ROA, ROE, and EPS as their averages were 0.036, 0.09, and 2.61 respectively. These worsened ratios strongly vindicated that some problems outweigh their condition into problematic such as leadership on the wrong hand or bureaucratic issues, operating under lower profit margins, asset utilization in unequal conditions, soaring operating costs, and inadequacy in risk management. Thirdly, the solvency ratio was measured concerning the ratio of the four tools. Out of four of these variables, the first two exhibited small figures as the average debt-to-total assets ratio and debt-to-equity (D/E) ratio was 0.612 and 3.202 respectively. So, the D/E ratio spiked higher as these industries were at a greater risk of being heavily reliant on debt and they could benefit from plummeting their reliance on debt. It is interesting that industries that have high liquidity have comparatively low profitability resulting in a chance of having a strong or moderate inverse relationship. Finally, the Z-score was estimated as it was observed mostly in the stress zone resulting in poor score performance. In other words, the bankruptcy of the industries (except Lafarge Holcim Bd Ltd (LHBL) and Heidelberg Cement Bd Ltd (HCBL)) still prevailed as overall their financial metrics were not only performing poor but also moving into impoverishment within two years. In other words, these industries need to be more vigilant as they can come forward to take help from investors and lenders by detecting potential risks. By doing these they can be capable of remedial measures by making decisions about extending credit or investing more in the future. Finally, an independent t-test was carried out to conclude in regard to the effect of the pandemic. Due to poor performance, the ultimate result of previous COVID-19 and afterward was not hampered as most of the ratios scored quite similar within two-time horizons.

Policy implications

This study aims to provide a clear understanding of the financial health of the cement industries of Bangladesh and the impact of COVID-19 on the industries. This study will help the policymakers of the companies as well as the cement industry find out the root cause of financial stress. As the evidence shows that COVID-19 has no significant impact on the financial positions of the companies, so there must be some other internal and external reasons behind the financial stress which are needed to be found out. Such

implications can be stated as below:

- Due to the competitive stage in cement industries and the last few decades, the number of industries is booming, and the capital behind running this huge industry needs more than enough capital to maintain tighter profit margins. So, innovation is needed to solve and meet the crisis of production as per requirement in the market and sustain for a long time.
- In order to gain profitability, policymakers need to ascertain the major macroeconomic factors such as GDP per capita, interest rates, and currency fluctuations can strongly influence the construction mechanism and infrastructure investments. Cement factories operating in multiple regions or exporting their products may face challenges due to these factors, leading to poor financial metrics.
- The government can take a forward step in prioritizing the domestic cement industries in mega projects and other development projects to accelerate the domestic cement industries. Moreover, exporting in wider areas can give a better chance to know how to sustain itself within a competitive world.
- Due to trade imbalances and financial constraints after the pandemic, the cost of raw materials has increased. As sole materials (clinker, Limestone, slag, fly ash, and gypsum) are export-oriented, so, policies behind profit and capital investment are to be rescheduled as the contemporary performance of most of the industries is in the place of bankruptcy.
- To boost its financial mechanism, sales, balance sheet, and overall statistics should be monitored in a stringent way so that unnecessary and third-party inclusion can be reduced and finally, profit can be ensured.
- High operating costs, non-recurring items, or inefficient use of resources activities are to be reduced so that ROA, ROE, EPS, and other profitability ratios will be rebounded.
- Cement manufacturing is highly energy-intensive and solely relies on the availability of raw materials that can be expensive and resource-intensive. So, sustaining under an alternative horizon of high energy costs and raw material prices but low skill or technological advantage can discourage the cycle of business (Hossain et al., 2020).

CONCLUSION

Financial soundness is a core part of financing into banking or private organizations for estimating the ability to pay its debts or obligations in accordance with covering its expenses and other operations (Mizan and Hossain, 2017). This study perceived seven industries' performance in light of liquidity, profitability, and solvency ratios from 2017 to 2022. For addressing distress or safety into a single metric, the researcher estimated the Altman Z-score in line with other scholars (Karim et al., 2021; Mizan and Hossain, 2017; Satryo et al., 2017). From the mean values of six consecutive periods, Altman Z scores it can be seen that only two industries (HCBL, LHBL) were in the safe zone, one (PCML) was in the distress zone and the others were in the grey zone. The rest of the others were in distress horizon. Though this study attempted to exhibit the nexus of the COVID-19 effect, yet, it did not find significant differences before and at or after this pandemic due to executing poor and capitalizing lower profit from the starting period. There maybe a very little substantial decrease in financial performance due to the coronavirus pandemic, as it is fully dependent on imported materials, but it is not significant enough to be noticeable on the financial performance indicators. The suffering cement industries need to get extra attention to recover from the disaster zone. Furthermore, distressed industries should pay extra attention to increase their profitability. Companies must manage their expenditures and expenses properly in order to go from the troubled zone to the safe zone.

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APPENDIX

Table A1: List of Cement Companies under the study:

| Name of the companies | Acronym |
|---------------------------|---------|
| Aramit Cement Ltd. | ACL |
| Confidence Cement Ltd. | CCL |
| M.I. Cement Factory Ltd. | MICFL |
| Heidelberg Cement Bd Ltd. | HCBL |
| LafaegeHolcimBd Ltd. | LHBL |
| Meghna Cement Mills Ltd. | MCML |
| Premier Cement Mills Ltd. | PCML |

Table A2: Analysis of Z score

| Measuring Financial Soundness of Selected Cement Companies in Bangladesh using Altman's Z score Model | | | | | | | | | | | | | |
|---|------------------------|------|---------------------------------|-----------------------------------|----------------------|----------------------------|-----------------------|--------|--------|--------|-------|-------|---------|
| SL No. | Company Name | Year | Working capital to total assets | Retained Earnings to total assets | EBIT to Total Assets | Market value to total debt | Sales to Total Assets | 1.2A | 1.4B | 3.3C | 0.6D | 1.0E | Z score |
| 1 | Aramit Cement Ltd. | 2017 | 0.439 | 0.246 | 0.068 | 4.261 | 0.446 | 0.526 | 0.345 | 0.226 | 2.556 | 0.446 | 4.100 |
| | | 2018 | -0.029 | -0.060 | 0.059 | 0.169 | 0.658 | -0.035 | -0.084 | 0.196 | 0.101 | 0.658 | 0.835 |
| | | 2019 | 0.525 | 0.330 | 0.009 | 3.207 | 0.172 | 0.630 | 0.462 | 0.030 | 1.924 | 0.172 | 3.218 |
| | | 2020 | -0.140 | -0.101 | 0.063 | 0.088 | 0.521 | -0.168 | -0.142 | 0.207 | 0.053 | 0.521 | 0.472 |
| | | 2021 | -0.098 | -0.076 | 0.066 | 0.238 | 0.301 | -0.117 | -0.107 | 0.217 | 0.143 | 0.301 | 0.437 |
| | | 2022 | -0.057 | -0.167 | -0.016 | 0.173 | 0.107 | -0.068 | -0.234 | -0.052 | 0.104 | 0.107 | -0.143 |
| 2 | Confidence Cement Ltd. | 2017 | -0.076 | 0.223 | 0.089 | 1.325 | 0.520 | -0.091 | 0.313 | 0.292 | 0.795 | 0.520 | 1.829 |
| | | 2018 | -0.067 | 0.243 | 0.019 | 2.062 | 0.492 | -0.081 | 0.341 | 0.064 | 1.237 | 0.492 | 2.054 |
| | | 2019 | 0.067 | 0.240 | 0.082 | 2.120 | 0.559 | 0.080 | 0.336 | 0.269 | 1.272 | 0.559 | 2.516 |
| | | 2020 | -0.113 | 0.187 | 0.109 | 0.825 | 0.411 | -0.135 | 0.262 | 0.359 | 0.495 | 0.411 | 1.392 |
| | | 2021 | -0.079 | 0.309 | 0.130 | 1.838 | 0.353 | -0.095 | 0.433 | 0.430 | 1.103 | 0.353 | 2.224 |
| | | 2022 | -0.175 | 0.278 | 0.047 | 1.200 | 0.339 | -0.210 | 0.389 | 0.155 | 0.720 | 0.339 | 1.393 |

| | | | | | | | | | | | | | |
|---|---------------------------|------|--------|-------|--------|--------|-------|--------|-------|--------|-------|-------|-------|
| 3 | M.I. Cement Ltd. | 2017 | 0.099 | 0.111 | 0.152 | 0.842 | 1.053 | 0.118 | 0.156 | 0.500 | 0.505 | 1.053 | 2.333 |
| | | 2018 | 0.075 | 0.104 | 0.064 | 0.929 | 0.667 | 0.090 | 0.145 | 0.212 | 0.558 | 0.667 | 1.672 |
| | | 2019 | 0.050 | 0.109 | 0.074 | 0.799 | 0.750 | 0.060 | 0.153 | 0.244 | 0.480 | 0.750 | 1.686 |
| | | 2020 | 0.004 | 0.097 | 0.050 | 0.533 | 0.724 | 0.005 | 0.136 | 0.166 | 0.320 | 0.724 | 1.351 |
| | | 2021 | 0.026 | 0.152 | 0.090 | 1.150 | 0.905 | 0.032 | 0.213 | 0.296 | 0.690 | 0.905 | 2.135 |
| | | 2022 | -0.015 | 0.115 | 0.055 | 1.096 | 1.089 | -0.019 | 0.160 | 0.181 | 0.657 | 1.089 | 2.069 |
| 4 | Heidelberg Cement Bd Ltd. | 2017 | 0.225 | 0.402 | 0.136 | 5.956 | 1.036 | 0.270 | 0.562 | 0.450 | 3.574 | 1.036 | 5.891 |
| | | 2018 | 0.097 | 0.410 | 0.137 | 5.168 | 1.358 | 0.116 | 0.574 | 0.452 | 3.101 | 1.358 | 5.601 |
| | | 2019 | -0.092 | 0.266 | 0.034 | 1.518 | 1.303 | -0.110 | 0.373 | 0.111 | 0.911 | 1.303 | 2.587 |
| | | 2020 | -0.106 | 0.293 | 0.039 | 1.622 | 1.094 | -0.127 | 0.411 | 0.128 | 0.973 | 1.094 | 2.479 |
| | | 2021 | -0.106 | 0.328 | 0.073 | 2.813 | 1.559 | -0.128 | 0.460 | 0.241 | 1.688 | 1.559 | 3.820 |
| | | 2022 | -0.147 | 0.250 | 0.019 | 1.879 | 1.684 | -0.019 | 0.349 | 0.064 | 1.127 | 1.684 | 3.207 |
| 5 | LafageHolcimBd Ltd. | 2017 | 0.267 | 0.110 | 0.042 | 10.315 | 0.582 | 0.321 | 0.154 | 0.138 | 6.189 | 0.582 | 7.385 |
| | | 2018 | 0.061 | 0.108 | 0.072 | 5.116 | 0.609 | 0.074 | 0.151 | 0.239 | 3.070 | 0.609 | 4.142 |
| | | 2019 | -0.037 | 0.089 | 0.091 | 2.770 | 0.530 | -0.044 | 0.125 | 0.300 | 1.662 | 0.530 | 2.573 |
| | | 2020 | -0.016 | 0.128 | 0.212 | 5.390 | 1.403 | -0.019 | 0.179 | 0.699 | 3.234 | 1.403 | 5.496 |
| | | 2021 | 0.070 | 0.202 | 0.332 | 7.819 | 1.566 | 0.084 | 0.283 | 1.095 | 4.691 | 1.566 | 7.720 |
| | | 2022 | -0.010 | 0.114 | 0.434 | 6.518 | 1.773 | -0.176 | 0.159 | 1.431 | 3.911 | 1.773 | 7.097 |
| 6 | Meghna Cement Mills Ltd. | 2017 | 0.039 | 0.085 | 0.076 | 0.603 | 1.078 | 0.047 | 0.119 | 0.250 | 0.362 | 1.078 | 1.857 |
| | | 2018 | 0.070 | 0.046 | 0.108 | 0.401 | 1.608 | 0.084 | 0.064 | 0.358 | 0.241 | 1.608 | 2.356 |
| | | 2019 | -0.128 | 0.045 | 0.120 | 0.304 | 1.900 | -0.154 | 0.064 | 0.396 | 0.182 | 1.900 | 2.388 |
| | | 2020 | -0.072 | 0.038 | 0.098 | 0.198 | 1.493 | -0.087 | 0.053 | 0.325 | 0.119 | 1.493 | 1.902 |
| | | 2021 | -0.083 | 0.034 | 0.037 | 0.180 | 0.826 | -0.100 | 0.048 | 0.121 | 0.108 | 0.826 | 1.004 |
| | | 2022 | -0.124 | 0.014 | 0.073 | 0.169 | 1.232 | -0.012 | 0.019 | 0.241 | 0.101 | 1.232 | 1.581 |
| 7 | Premier Cement Mills Ltd. | 2017 | -0.058 | 0.171 | 0.085 | 1.211 | 0.886 | -0.069 | 0.239 | 0.281 | 0.726 | 0.886 | 2.064 |
| | | 2018 | -0.141 | 0.170 | 0.073 | 0.889 | 0.775 | -0.169 | 0.237 | 0.240 | 0.534 | 0.775 | 1.617 |
| | | 2019 | -0.085 | 0.149 | 0.076 | 0.531 | 0.745 | -0.102 | 0.209 | 0.250 | 0.318 | 0.745 | 1.421 |
| | | 2020 | -0.230 | 0.136 | 0.049 | 0.388 | 0.521 | -0.276 | 0.190 | 0.161 | 0.233 | 0.521 | 0.829 |
| | | 2021 | -0.253 | 0.130 | 0.056 | 0.422 | 0.534 | -0.304 | 0.181 | 0.184 | 0.253 | 0.534 | 0.849 |
| | | 2022 | -0.291 | 0.072 | -0.018 | 0.223 | 0.515 | -0.350 | 0.101 | -0.059 | 0.134 | 0.515 | 0.341 |

Sources: Annual Report

Table A3: Ranking of the Financial Position of Selected Cement Companies (Based on Mean Ratios)

| Ratios | Name of the Companies | | | | | | |
|-------------------------------------|-----------------------|----------|----------|----------|----------|----------|----------|
| | ACL | CCL | MICFL | HCBL | LHBL | MCML | PCML |
| Liquidity Ratio | | | | | | | |
| Current Ratio | 1 | 6 | 3 | 4 | 2 | 5 | 7 |
| Acid-Test Ratio | 1 | 5 | 3 | 7 | 2 | 4 | 6 |
| Inventory Turnover (times) | 5 | 6 | 3 | 4 | 7 | 2 | 1 |
| Current Assets to Fixed Assets | 1 | 6 | 3 | 4 | 7 | 2 | 5 |
| Net Working Capital to Total Assets | 1 | 6 | 3 | 4 | 2 | 5 | 7 |
| Mode | 1 | 6 | 3 | 4 | 2 | 5 | 7 |
| Profitability Ratio | | | | | | | |
| Gross Profit Margin | 2 | 6 | 5 | 4 | 1 | 7 | 3 |
| Net Profit Margin | 6 | 1 | 4 | 5 | 2 | 7 | 3 |
| Total Asset Turnover [Times] | 7 | 6 | 4 | 2 | 3 | 1 | 5 |
| Return on Assets | 7 | 2 | 5 | 3 | 1 | 6 | 4 |
| Return on Equity | 1 | 2 | 7 | 5 | 3 | 6 | 4 |
| EPS | 7 | 1 | 5 | 2 | 6 | 4 | 3 |
| Operating Profit Ratio | 2 | 7 | 4 | 6 | 1 | 5 | 3 |
| P/E Ratio | 6 | 5 | 7 | 1 | 2 | 3 | 4 |
| Mode | 3 | 4 | 1 | 6 | 7 | 2 | 5 |
| Solvency Ratio | | | | | | | |
| Debt to Total Assets Ratio | 3 | 6 | 4 | 5 | 7 | 1 | 2 |
| Debt to Equity Ratio | 1 | 6 | 4 | 5 | 7 | 2 | 3 |
| NAVPS | 3 | 1 | 5 | 2 | 7 | 6 | 4 |
| Times Interest Earnings | 2 | 4 | 6 | 1 | 3 | 7 | 5 |
| Mode | 3 | 6 | 4 | 5 | 7 | N/A | N/A |
| Z-score | | | | | | | |
| Z Score (Average) | 6 (1.49) | 3 (1.90) | 5 (1.88) | 2 (3.93) | 1 (5.74) | 4 (1.85) | 7 (1.18) |