

Performance Evaluation of Cement Industry of Bangladesh: A Case Study on Some Selected Firms

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Abstract

Financial analysis is a logical way of inspecting the financial position of a company. It helps to measure and realize the position of the company. It tries to cooperate the creditors, investors, and managers to determine the profitability of the company, to control costs, and to pay the interest and principal on its debt. Besides these, it gives the opportunity to know the liquidity of the company. For measuring the financial health of a business firm, there are lots of techniques available. But the Altman's Z-score has been proven to be a reliable tool across contexts. Bangladesh cement industry is a unique one because, the industry is producing a higher amount of cement than the local demand having no supply of local raw materials. The main objective of the study is to assess the fundamental financial health of this industry using Z-score model. Here, listed cement firms are considered in this study. The required information has been collected from the annual reports of the selected companies and from other sources. The study revealed that four firms, Aman Cement, Crown Cement, Cemex Cement and Shah Cement are financially sound. The findings of the study can be useful for the managers to take financial decision, the stockholders to choose investment options and others to look after their interest in the concern cement manufacturers of the country.

Keywords: Cement Industry, Financial Soundness, Prediction, Working Capital, Market Value of Assets, Total Assets, Financial Performance.

1.0. Introduction

Financial performance is a subjective measure of how well a firm can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time. It has become very significant and an integral part to measure the financial performance of a firm in the context of emerging hyper competition in the business sector. There are many different ways to measure financial performance. A general belief is that a firm's financial performance depends on certain key financial factors i.e. turnover, profit and the variables which are found in the balance sheet of a firm, have a direct and indirect relation with each other. By establishing a close relationship between the variables, a firm can analyze its financial performance in terms of liquidity, profitability and viability. In order to measure the performance, analyzing the ratios is one of the best tools. Financial ratios are calculated

from historical data provided by the firms. Although ratios consist of past data, management can use ratios for identifying the internal strengths and weaknesses. Ratios are also helpful for the investors to compare companies within the same industry. Ratios are generally meaningless as individual numbers, but they are meaningful when compared to historical data and industry averages. As far as ratios are concerned, there are numbers of ratios existing to evaluate the financial performance of a firm. These ratios can be classified into several categories such as liquidity ratios, profitability ratios, solvency ratios etc. Liquidity ratios measure financial performance through assessing the ability of a company to meet its short-term debt obligations whereas profitability ratios do the same job through evaluating company's ability to generate earnings relative to sales, assets and equity. Another effective indication of corporate performance in predicting financial solvency of a firm is Altman's Z-score. This model devotes to predict possibilities of bankruptcy of manufacturing concerns. There is evidence that it has 76.9% accuracy in predicting the bankruptcy of the underlying sample (Begley et al., 1996). In the study, he also finds that the model performs better in USA during the 1980s than the 1990s. Altman (1968) defines five predicted factors that can be used to test the validity of Multivariate model. The model is based on financial ratios. Using financial ratios to predict bankruptcy can be accurate up to 90% (Chen et al., 1981). Bangladesh cement industry is a unique one. Because, the industry is producing a higher amount of cement than the local demand. Furthermore, there is very acute, and unhygienic competition exists in the industry. On the other hand, the firms are producing almost same quality cement. So, complete dependency on the imported raw materials and unhealthy competition make the companies worse in terms of financial sustainability. So, it is a matter of great regret to assess the financial health of the firms in the industry and predict the bankruptcy possibility. In this context, the study is a very important one to provide the right information to the stakeholders about the financial health of the companies under the selected cement industry of Bangladesh. With this view, the objectives of the study are one, to assess the fundamental financial health of the cement industry of Bangladesh; on the basis of Z-score. The first segment of the article includes introduction and purpose of the study. The next section presents methodology of the study and review of relevant prior literatures is presented in part three. Section four portrays results and findings followed by conclusion in section five.

2.0. Purpose of the Study

The purpose of the study is outlined below:

- * Mainly to measure the financial health of the company using Altman's Z-score test.

- * To test the correlations of five ratios (whose are used to calculate ultimate Z-score) with Z-score.
- * To analyze the short-term financial position through liquidity analysis.
- * To analyze the short-term profitability position of the company over the study period.
- * And finally, to analyze the association of liquidity and profitability with the risk factor.

3.0. Methodology of the Study

The study focuses on the cement industry of Bangladesh. There are two stock exchanges in Bangladesh, Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE). Thus, all-inclusive sampling technique is followed for the current study. The required information of the four cement firms (Aman, Crown, Cemex and Shah) has been collected from the annual reports of the selected companies. As the biggest and oldest stock exchange of Bangladesh, we consider the market price of DSE. Other data have been collected from different other sources including the internet and newspapers of the country. The hypothesis we have taken is that;

H0: The values of X1, X2, X3, X4, and X5 are uniform in the sample units.

For analyzing the performance of the company fundamentals one way for predicting bankruptcy, the Altman Z-score have been used. Through the following equation possibility of bankruptcy of the industry has been judged;

$$Z = 1.2X1 + 1.4X2 + 3.3X3 + 0.6X4 + 0.999X5$$

Where:

Z = Discriminant function score of a firm

X1 = Working Capital (WC) / Total Assets (TA); X2 = Retained Earnings (RE) / Total Assets (TA); X3 = Earnings before Interest and Taxes (EBIT) / Total Assets (TA); X4 = Market Value of Equity (MVE) / Book value of Total Liabilities (TL); X5 = Sales / Total Assets.

The Z-score model (developed in 1968) was based on a sample composed of 66 manufacturing companies with 33 companies in each of two matched pair groups.

Z-Score and Survivability Indicators:

With the help of Altman guidelines, the financial health can be measured.

4.0. Literature Review

Financial analysis is a foundation of knowing how well a business has been progressing. It is said that in so far as bankruptcy is due to unforeseeable events and therefore, it cannot be predicted (Morris, 1998). On the other hand, there are several researchers (Altman, 1968; Zmijewski, 1984; Kida, 1998; Shirata, 1998) who use some models for predicting bankruptcy. Among others, corporate bankruptcy prediction model developed by Altman in 1968 is the most accepted and widely used tool

Table 1. Z-Score and Survivability indicators.

Situation	Z-Score	Indicator	Remarks
1	Below 1.8	Bankrupt	Danger zone, bankruptcy is very much likely to occur.
2	Between 1.8 and 2.99	Healthy	Financial viability is considered healthy. The failure in Gray area, bankruptcy cannot easily be predicted
3	3.0 and above	Stable	Bankruptcy is unlikely to occur.

(Mizan et al., 2011). Conversely, some researchers (Chava et al., 2004; Addullah et al., 2008) proved that some other models are more accurate than Altman's model. In the following paragraphs, we will present some relevant literatures. Altman (1968) noted that ratios measuring profitability, liquidity and solvency prevailed as the most significant indicators, but the order of their importance is not clear. So, multiple discriminants analysis was used by Altman (1968) for measuring soundness and prediction of bankruptcy of the firms. In this study, the initial sample was sixty-six firms to establish a function that the best discriminates between companies in two mutually exclusive groups: bankrupt and non-bankrupt firms. The developed model was extremely accurate in classifying 95% of the total sample correctly. On the basis of findings, he concluded that the bankruptcy prediction model is an accurate forecaster of failure up to two years prior to bankruptcy. The ratios used in this model are working capital/total assets, retained earnings/ total assets, EBIT/total assets, market value equity/total debt and sales to total assets. Shirata (1998) developed an alternative model for bankruptcy prediction. He used four variables like, e.g., (i) retained earnings/total assets, (ii) (current period liabilities and shareholder's equity/previous period liability and shareholders' equity)-1, (iii) interest and discount expense/ (short term borrowings + long term borrowings + corporate bond + convertible bond + note receivable discounted), and (iv) note payable + accounts payable) $\times$ 12/Sales. He stated that the model can predict bankruptcy with more than 86.14% accuracy regardless of industry and size. The Altman Z score model is used in different countries for predicting bankruptcy. Al-Rawi et al. (2008) used the Altman z-score analysis to predict a firm's insolvency. They followed case study method and selected "Jordan Establishment for Marketing Durable goods" as a case. The z-score of the firm for the given period (2002-2004) was less than 1.81. They have made a comment that the firm has increased its debt and will be facing bankruptcy in the near future. Vergos et al. (2009) investigated whether Z-score models can predict bankruptcies for a period up to three years earlier. Results showed that Altman model performed well in predicting failures. They concluded that the results can be used by company management for financing decisions, by regulatory authorities and by portfolio managers in stock selection. Ramaratnam et al.

(2010) measured financial soundness of Indian steel industry by using Z-score model. The study was based on five years' data (2006-2010) of five firms of the steel industry. Their study revealed that all the selected companies are financially sound during the study period. Alkhatib et al. (2011) conducted a study to report the effect of financial ratios in bankruptcy prediction in Jordanian listed companies through the use of Altman and Kida models. The study sample included sixteen non-financial service and industrial companies for the years 1990-2006. According to their results, out of the two models Altman's model has an advantage in company bankruptcy prediction, with a 93.8% average predictive ability of the five years prior to the liquidation incident, while the average for Kida's model is 69%. They suggested that the Jordanian listed companies should at least apply one of these models with high credibility for predicting corporate bankruptcy. In Bangladesh Z-score model, has also been used in different studies. It is a tool to communicate between internal and external stakeholders. For example, it assists internal users to develop explanations for financial results and perhaps help management to predict the financial results in their firm for near future. External stakeholders such as creditors are able to assess a company's credit worthiness to ensure a company is able to pay off their debts. Financial analysis includes financial ratio analysis which contains liquidity ratios, leverage ratios, activity ratios, profitability ratios and valuation ratios to indicate a company's performance. In acquiring information regarding firm's objectives, profitability, efficiency and uncertainty level, these ratios are adopted. The main objective of using Altman's Z-score in the case study is to predict insolvency rather than guessing the future trends from historical data. It helps researchers to evaluate performance of a business in near future. Altman's Z-score model can integrate well with financial ratios and be used to determine business bankruptcy in the future. It suggests that Altman's Z-score year is useful to financial ratio analysis in determining likelihood of bankruptcy of businesses. In addition, financial analysts should take current economic conditions into accounts before making any judgments, as financial ratios differ according to recent trading situation. Altman's formula appeared to rate higher than other performance metrics such as the widely-used return ratios (i.e., ROE & ROA), economic profit, and growth rate of sales, cash flow, and expenses. Carton and Hoffer's primary message is that Altman's Z-score is more than a financial distress predictor; it is also efficacious as a performance management tool. The empirical analysis examined all cement companies listed in the DSE during the period 2011-2014 and the discontinuations of operation for these companies in the period. They investigated the efficacy of Z-score models to predict bankruptcies for a period up to four years. The study confirmed the efficiency of Altman model in predicting failures. Their results could be put to use by a broad

spectrum of stakeholders including company management for financing decisions, regulatory authorities, as well as investors and portfolio managers in stock selection.

4.1. Working Capital / Total Assets Ratio (X1)

This ratio basically measures the firm's liquid position in relation to its capitalization i.e. the net current assets or working capital of a company as a percentage of its total assets. Working capital, which is current assets minus current liabilities, helps stakeholders analyze the number of assets required to run the day to day operations of a company and the extent of assets tied up in working capital. Therefore, if this (working capital to total assets) ratio is high, which could be due to realizing revenue from sales much quicker than making payments for raw materials and other goods and/or services, it would mean that the firm is able to match its account payable obligations on time.

4.2. Retained Earnings/Total Assets (X2)

This ratio measures the firm's ability to accumulate earnings using its assets. A higher Retained Earnings to Total Assets ratio is preferred by most analysts and investors because this reflects that the company is able to retain more earnings. The Retained Earnings to Total Assets Ratio of 1:1 or 100% is considered as ideal. But in reality, this ratio (1:1) is impossible for most businesses to achieve. A more realistic objective for most firms would be to have this ratio as close to 100% as possible or at least above average within its industry sector or improving. A higher ratio would indicate that growth is achieved by increased financing from profits and not by increasing the debts. On the other hands, a low ratio would assume that growth may not be sustainable if it is financed from increasing debts and not by rein-vesting the profits.

4.3. Earnings before Interest and Taxes/Total Assets (X3)

This ratio is much similar to Return on Assets (ROA) ratio in which net earnings is used, whereas in this ratio earnings before Interest and Tax (EBIT) are used. This ratio basically measures operating efficiency (all profits before taking into account interest payments and in-come taxes). It assumes operating earnings as one of the important parameters for long-term viability of the firm. In other words, this ratio measures the productivity of a firm's assets and is independent of any tax liability as well as leverage factors. Many investors and analysts look at this ratio as the one reflecting a firm's earning powers from its assets.

4.4. Market Value of Equity/Book Value of Total Liabilities (X4)

This ratio measures long term solvency of a firm i.e. how much the firm's market value would decline before liabilities exceed assets, if it happens. Book Value of Total Liabilities is the sum of all current and long-term liabilities of a firm's balance sheet. Whereas, Market Value of

Equity is the total current market value of all common and preferred shares. Since market value of equity takes into account the value of future performance of a firm and its intangible assets, this ratio is the only forward looking ratio in the Z-score calculation. This is an inverse of well-known Debt to Equity Ratio (or Total Debt to Total Market Value of Equity or Total Liabilities to Market Capitalization).

4.5. Sales/Total Assets (X5)

This ratio is also known as assets turnover ratio and measures the amount of sales generated using a firm's assets. This ratio targets on sales generation capacity of its assets and management, therefore, the higher the ratio the better it is. In other words, a low ratio would indicate that the total assets (and the management) of the firm are not efficient to provide better revenues.

4.6. Liquidity and its Ratios

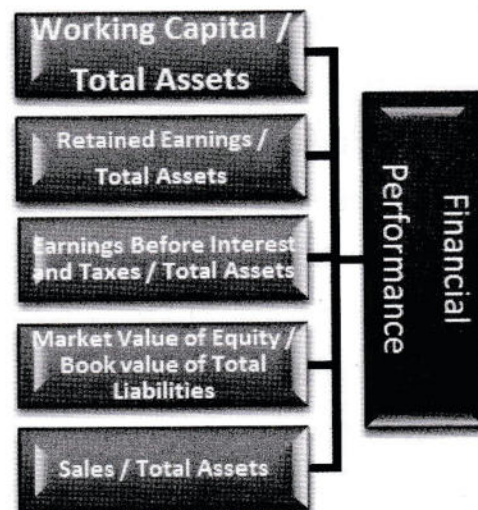
Liquidity includes designing and regulating current assets and current liabilities in such a manner that eliminates the risk of the incapability to meet due short-term obligations, on one hand, and avoids unnecessary investment in these assets, on the other hand. Liquidity has been taken as a vital tool to examine the sustainability and liquidity position of any enterprise that may also help any organization to originate maximum profits at low cost. It has been stated that the Liquidity Ratios help to predict financial performance. From this analysis, we can know that a business has high profitability, it can face short-term financial problems and its funds are locked up in inventories and receivables not realizable for months. Any failure to meet these can damage its reputation and creditworthiness and in extreme cases even lead to bankruptcy. In addition to, liquidity ratios are working with cash and near-cash assets of a business on one side, and the immediate payment obligations (current liabilities) on the other side.

4.7. Profitability and its Ratios

Profitability is the return received on the total assets of the company. Profitability is the primary goal of all business ventures. Without profitability, the business will not survive in the long run. So, measuring current and past profitability and projecting future profitability is very important. Profitability is measured with income and expenses. The success of the company typically rests on its returns earned, keeping the liquidity prospects in view. Usually, it is a tough task to tradeoff between the liquidity and profitability, as the conservative policy of working capital may confirm sound liquidity but threatens the profitability. On the other hand, aggressive policy helps in making profits but the liquidity is not promised. Before deciding on an appropriate level of working capital investment, a firm's management has to evaluate the tradeoff between expected profitability and the

risk that it may be unable to meet its financial obligations. In this article, it has been discussed about the return on assets as an important percentage that shows the company's ability to use its assets to generate income. He said that a high percentage indicates that company is doing a good utilizing the company's assets to generate income. He notices that the following formula is one method of calculating the return on assets percentage. $\text{Return on assets} = \text{net profit} / \text{total assets}$. The net profit figure that should be used is the amount of income after all expenses, including taxes. He announced that the low percentage could mean that the company may have difficulties meeting its debt obligations.

4.8. Research Framework



5.0. Questions and Hypothesis

5.1. Research Question

The objective of this research can be gained through getting the answers of the following questions:

- * Is there any relationship between Working Capital to Total Assets and Z-score?
- * Is there any relationship between Retained Earnings to Total Assets and Z-score?
- * Is there any relationship between EBIT to Total Assets and Z-score?
- * Is there any relationship between Market Value of Equity to Total Liabilities Z-score?
- * Is there any significant relationship between Sales to Total Assets and Z-score?

5.2. Null Hypothesis (H₀)

Keeping the above research questions in mind, the following hypothesis were framed and tested during the study period.

- Ha (1): There is significant relationship between Working Capital to Total Assets and Z-score.
- Ha (2): There is significant relationship between Retained Earnings to Total Assets Z-score.
- Ha (3): There is significant relationship between EBIT to Total Assets and Z-score.
- Ha (4): There is significant relationship between Market Value of Equity to Total Liabilities and Z-score.
- Ha (5): There is significant relationship between Sales to Total Assets and Z-score.

6.0. Methodology

Research design

This research can be classified into different designs under several categories. Those are degree of research question crystallization, method of data collection, researcher control of variables etc. First of all, it is a formal study because the goal of the research is to test the hypotheses and answer the research questions posed. It began with the hypotheses and research questions and involves precise procedures and data source specifications. No communication process has been conducted for the completion of the research. No responses were taken from any kind of persons by asking any questions. So, it can be compared with the monitoring process while collecting the data for the research. The job was to report what had happened to the company and analysis the financial statements, not to control the variables in the sense of manipulating them. As the main duty was limited to holding factors constant by judicious selection of subjects according to strict sampling procedures and by statistical manipulation of findings, it was an ex post facto design. The research is very similar to a reporting study because it provides summation of data, and generates statistics for comparison. We can also use these data to obtain a deeper understanding of the company's financial position. The research has been carried out once and it represents a snapshot of one point in time. So, it is a cross-sectional study under the category of time dimension. The research was designed for breadth rather than depth. Hypotheses were tested quantitatively and the generalization of our findings was presented based on the representativeness of the sample. So, it can be inferred that it is a statistical study. The major parameters of the methodology include:

- * Data collection (annual reports of Shah, Cemex, Crown and Aman tending from 2011-2014).
- * In order to analyze financial performance in terms of liquidity, solvency, profitability and financial efficiency, various accounting ratios have been used.
- * Analyzing and interpreting the information available in the financial statements and drawing meaningful conclusions from them.
- * Various statistical measures have been used i.e. standard deviation, mean, correlation etc.

* Finally, drawing conclusions about the financial performance of Aman, Shah, Crown, and Cemex using Altman's Z-score analysis.

7.0. Results and findings

As mentioned earlier Z-score will be calculated by using the following equation:

Z-score equation:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

To measure Z-score for Aman, Shah, Crown, and Cemex, all the ratios required were calculated first as input to Z-score models. Using data from the annual financial reports from financial year 2011-14. Table 2 represents the Working Capital to Total Assets Ratio: Table 2 shows that the Working Capital to Total Assets Ratio is not stable but varying between a low of -0.4392 for the year 2011 and a high of -0.0478 for the year 2014

Table 2. Working Capital to Total Assets (In Taka. in Thousands).

Year	Current Assets	Current Liabilities	Working Capital	Total Assets	X1= WC/TA
2014	5,190,219	6,100,280	(910,061)	19,027,323	0.0478
2013	3,912,006	8,443,980	(4,531,974)	18,523,368	0.2447
2012	3,450,421	8,108,312	(4,657,891)	18,559,381	0.2510
2011	2,317,596	10,185,573	(7,867,977)	17,914,804	0.4392

Source: Researchers' own analysis

Here are some statistical measurements of the above data

Table 3	WC'000	TA'000	X1
Mean	(4,782,690)	18,191,108	-0.2656
SD	2248242.6	626258.187	0.1276
Min	(7,867,977)	17,291,615	-0.4392
Correlation of X1 with Z-score = 0.9046			

Source: Researchers' own analysis

The average of this ratio is -0.2656 for all the years under observation. The following diagram gives an overview of the working capital to total assets ratio that is maintained in the company over the years.

Table 4. Retained Earnings to Total Assets (In TK. in Thousands).

Year	Retained Earnings	Total Assets	X2
2014	(944,130)	19,027,323	-0.0496
2013	(3,490,257)	18,523,368	-0.1884
2012	(5,343,728)	18,559,381	-0.2879
2011	(3,156,087)	17,914,804	-0.1762

Source: Researchers' own analysis

The statistical measurements are as follows:

Table 5.	RE'000	TA'000	X2
Mean	(2,833,744)	18,191,108	-0.1555
SD	1560763.71	626258.187	0.0835
Min	(5,343,728)	17,291,615	-0.2879
Max	(944,130)	19,027,323	-0.0496
Correlation of X2 with Z-score =0.6247			

Source: Researchers' own analysis

Above data and ratio analysis show that Retained Earnings to Total Asset ratio has always been negative for Shah, Cemex, Crown and Aman. With lowest of -0.2879 in year 2011 and averaging -0.1555 for all the years, it can be assumed that the company consistently made losses and was unable to leverage the high debts. It can also be assumed that the firms are unable to generate profits out of its assets.

From the Table 6, it can be noted that lowest EBIT to Total Assets ratio is -0.0623 for the year 2011 and highest is 0.2095 for the previous year 2014. Overall this ratio is very low with average of 0.0990 for all years of operations of Shah, Cemex, Crown and Aman. This reflects, overall, very poor earning power of the firm. Now we can see the movement of X2 throughout the years.

Table 6. EBIT to Total Assets (In TK. in Thousands).

Year	EBIT	Total Assets	X3
2014	3,985,707	19,027,323	0.2095
2013	3,336,088	18,523,368	0.1801
2012	206,884	18,559,381	0.0111
2011	(1,115,290)	17,914,804	-0.0623

Source: Researchers' own analysis

Some statistical measurements are:

Table 7.	EBIT	TA	X3
Mean	1,815,126	18,191,108	0.0990
SD	1928838.98	626258.187	0.1043
Min	(1,115,290)	17,291,615	-0.0623
Max	3,985,707	19,027,323	0.2095
Correlation of X3 with Z-score =0.9247			

Source: Researchers' own analysis

Table 8. MVE to Total Liabilities (In TK. in Thousands).

Year	MV of Equity	Current Liabilities	Non-Current Liabilities	Total Liabilities	X4
2014	11,044,543	6,100,280	1,882,500	7,982,780	1.3835
2013	8,380,747	8,443,980	1,698,641	10,142,621	0.8263
2012	6,451,983	8,108,312	3,999,086	12,107,398	0.5329
2011	2,768,479	10,185,573	4,960,752	15,146,325	0.1828

Source: Researchers' own analysis

Statistical measurements:

Table 9.	Equity	TL	X4
Mean	6,083,819	12,107,289	0.5847
SD	3187676.7	2681388.781	0.4558
Min	1,698,641	7,982,780	0.1828
Max	6,437,548	15,146,325	1.3835
Correlation of X4 with Z-score =0.8981			

Source: Researchers' own analysis

In most of the years there is positive EBIT in Shah, Cemex, Aman and Crown but the amount is too poor. It is not usually expected by the shareholders. As the amount of total assets is consistent throughout the years the main reason for fluctuation in the ratios is the change in EBIT. Though the amount of EBIT is less but it is pretty much consistent in the whole study period except in the middle two years. Positive thing is that the highest EBIT for the company is in 2014. It can be easily guessed from these ratios that financial performance of Crown is not good. And the correlation test says the same thing and it shows a very strong positive relation between the ratio of EBIT to total

assets and Z-score. The correlation between the variables is 0.9246. Next in Table 8, the calculations of Market Value of Equity to Book Value of Total Liabilities Ratio (X4) for Shah, Cemex, Aman and Crown are shown. This ratio is basically reciprocal of well-known Debt to Equity Ratio. This ratio for Aman, Crown, Cemex and Shah are positive for all the years in operation switch lowest ratio being 0.1828 and averaging 0.5847 for the duration under study.

Though market value of equity is always positive in the study period but it was not good enough in compare to the company's liability. In all the years, the amount liability was higher than equity except in 2013. The higher the equity to debt ratio the less risky the company is. Observing the trend of this ratio it can be said that the company is becoming more dependent to its equity rather than debt as the ratio of MVE to Equity is increasing in the last few years. In the last three years, the company is decreasing the amount of liability while increasing the amount of equity. Here again the correlation of X4 with Z-score is positive and the value is 0.8981. Finally, in Table 10 we calculated the last required component, the Sales to Total Assets ratio (X5) for Aman, Crown, Cemex and Shah. This ratio is also known as Assets Turnover Ratio which measures the amount of sales generated using a firm's assets.

Table 10 show that Assets Turnover Ratio is the lowest i.e. 0.3157 for the year 2010 and highest is 0.5955 for the latest year 2013. Overall this ratio is averaging 0.4331 for the Aman, Crown,

Table 10. Sales to Total Assets (In TK. in Thousands).

Year	Net Sales	Total Assets	X5
2014	11,330,374	19,027,323	0.5955
2013	10,640,061	18,523,368	0.5744
2012	6,098,478	18,559,381	0.3286
2011	5,655,374	17,914,804	0.3157

Source: Researchers' own analysis

Some statistical measurements for X5

Table 11	Sales	TA	X5
Mean	7,913,325	18,191,108	0.4331
SD	2471220.24	626258.187	0.1251
Min	5,655,374	17,291,615	0.3157
Max	11,330,374	19,027,323	0.5955
Correlation of X5 with Z-score =0.9346			

Source: Researchers' own analysis

Cemex and Above ratio results show that Assets Turnover Ratio is the lowest i.e. 0.3157 for the year 2010 and highest is 0.5955 for the latest year 2013. Overall this ratio is averaging 0.4331 for the Aman, Crown, Cemex and Shah for the period 2011-2014. So, on an average the turnover of those companies is less than of their assets. The next graph gives an overview of Sales to Total Assets ratio, the final component of Z-score, which is maintained in the companies over the years. Sales to total assets ratio is close to half during the study period. There is weak relationship between net sales with total assets but it has positive impact on Z scores. Usually higher ratio will decrease the possibility of bankruptcy of the company. Company's sales are increasing in recent years. And the final outputs of Z-score are also more satisfactory in recent years. This indicates a positive relationship. The correlation test says the same. The correlation of sales to asset ratio with Z-score is 0.9346, which is the highest among all the correlation scores.

Here, in this research paper Z-score is the determinant of financial performance which is the dependent variable. The independent variables showed in the conceptual frame work are the five components of Z-score model. After testing the correlation among dependent variable and all the independent variables we found very good positive relationship. The summary of the test is given below.

Table 12. Z-score Values & Correlation of Z-score with other variables.

Year	x1	x2	x3	x4	x5	Z-score	Z-zone
2014	-0.0478	-0.0496	0.2095	1.3835	0.5955	1.9840	Healthy/Grey Zone
2013	-0.2447	-0.1884	0.1801	0.8263	0.5744	1.1014	Bankrupt /Distress
2012	-0.2510	-0.2879	0.0111	0.5329	0.3286	-0.0224	Bankrupt /Distress
2011	-0.4392	-0.1762	-0.0623	0.1828	0.3157	-0.5569	Bankrupt /Distress
Where, Z-Score = $1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5$							

Source: Researchers' own analysis.

Some other statistical information of Z-score:

Table 13.	Z-score
Mean	c
SD	0.8911
Min	-0.5569
Max	1.9840

From the results above, we can say that the Z-score for Aman, Crown, Cemex and Shah are excluding the most recent year over the period of study. The Z-score ranges from -0.5569 (lowest) to 1.9840 (highest) and this means, as referred to the Table 1 (of survivability indicator), that Aman and Crown are consistently in danger zone. The mean Z-score (0.5697) indicates that the firm is facing severe financial distress and this dangerous level might lead to the bankruptcy of firm. But recent good performance of the company is presenting some good signs to do well in the future. Crown faced the worst situation in 2011 and from then it is performing well gradually. To be more assured about the financial performance of Aman, Crown, Cemex and Shah and the validity of using Z-score as the solvency determinant tool we calculated the revised Z-score values for Shah. Survival indicators in the modified form of Z-score are as follows:

$Z > 2.99$ - "Safe" Zones; $1.81 < Z < 2.99$ - "Grey" Zones; $Z < 1.81$ - "Distress" Zones (Wikipedia).

Table 14. Shows the revised Z-score values.

Table 14. Z-score values under modified method.

Year	x1	x2	x3	x4	x5	Revised Z-score
2014	-0.0478	-0.0496	0.2095	1.3835	0.5955	2.3849
2013	-0.2447	-0.1884	0.1801	0.8263	0.5744	-0.1414
2012	-0.2510	-0.2879	0.0111	0.5329	0.3286	-1.9506
2011	-0.4392	-0.1762	-0.0623	0.1828	0.3157	-3.6818
Where, Z-Score = $6.56X1 + 3.26X2 + 6.72X3 + 1.05X4$						

The results obtained from the original Z-score model are confirmed by modified Z-score model also. From the results in the Table 14 above, we can see that the Z-score for LSC ranges from a low of -3.6818 to 2.3849 (highest) and this means, as referred to the survival indicators for modified Z-score, is in danger zone during most of the periods of study. The mean Z-score being -0.9704 confirms the same as what is predicted using original Z-score model. We can infer that the firm is facing severe financial distress during the time period of study.

7.1. Liquidity Ratio Analysis

Before starting the analysis let us see the ratios at glance. Following the equations of table 15 liquidity ratios of LSC for the last six years have been calculated for comparison. Table 16 is the summary of all calculations. The ratios are ranked in the order of their influence on liquidity. Further,

Table 15. Liquidity ratios.

Current Ratio	Current Assets/ Current Liabilities
Quick Ratio	(Current Assets - Inventory)/ Current Liabilities
Inventory Turnover Ratio	Cost of goods sold / Inventory
Debtors Turnover Ratio	Revenue / Accounting receivables
Fixed Assets Turnover Ratio	Revenue / Net fixed assets

Source: Researchers' own analysis

ultimate rank has been calculated from the average of all the five ratios for a year. Ultimate ranking has been done on the principle that the higher the average, the more profitable is the liquidity position and vice versa. According to this table the company is more liquid in 2013. Although Aman was most liquid in 2013

based on the theory applied here but it was better financial position in the last two years. The liquidity in 2013 was so good because of an abnormal rise in debtors' ratio and that happened because of extreme low receivables. Observing the table, it can be said that the firm had lower current assets than current liabilities. The amount of current assets is less than half of the total current liabilities in most of the years. Actually in 2013, Crown has increased its current and quick ratio at least by 85 % from any other year. An important matter to notice, all the ratios of 2013 have good ranking in compare to the year of 2009. This is a good sign for the company. And here is the ranking

Table 16. Liquidity ratios with ranking.

Year	Current ratio		Quick ratio		Inventory ratio		Debtors ratio		Fixed asset ratio		Average	Rank
	Ratio	R a n k	Ratio	R a n k	Ratio	R	Ratio	R	Ratio	R		
2013	0.8508	1	0.5896	1	4.1589	2	4.5709	4	0.8188	1	2.1978	2
2012	0.4633	2	0.2668	2	3.8872	3	4.9404	3	0.7282	2	2.0572	4
2011	0.4255	3	0.2316	3	3.5213	5	3.7823	6	0.4036	5	1.6729	6

Source: Researchers' own analysis

Table 17. Profitability ratios.

Gross Profit Ratio	Gross profit / Revenue
Operating Profit Ratio	Operating income / Revenue
Net Profit Ratio	Net income / Revenue
Return on Net Worth Ratio	Net income / (Share capital + Retained earnings)
Return on Capital Investment Ratio	(Net income - Dividend) / Total capital

following the same method used in case of ranking of liquidity ratios. Same method has been followed for ranking the profitability ratios. Higher ratio represents higher profitability. So, the company was most profitable in 2013 and lowest profitable in 2011. Actually, faced highest loss in

Table 18. Profitability Ratios with Ranking.

Year	Gross Profit Ratio		Operating Profit Ratio		Net Profit Ratio		Return on NW Ratio		Return on Capital Ratio		Average	R a n k
	Ratio	R a n k	Ratio	R a n k	Ratio	R a n k	Ratio	R a n k	Ratio	R a n k		
2014	0.4151	1	0.3518	1	0.2247	1	0.2386	1	0.2192	1	0.2899	1
2013	0.3937	3	0.3135	4	0.1742	2	0.2282	3	0.1596	3	0.2538	2
2012	0.0919	6	0.0339	5	-0.3587	6	-0.3510	5	-0.1890	5	-0.1546	5
2011	0.1022	5	-0.1972	6	-0.2864	5	-0.6111	6	-0.2790	6	-0.2543	6

2012 in the study period. The method of ranking seems acceptable because the financial performance calculated using Z-score model is identical to the financial performance according to profitability ratio

7.2. Trade-off between Risk and Profitability

Trade-off between risk and profitability can be made by calculating the risk factor. The analysis can be done through working capital policies of the company. Risk factor can be calculated through the following formula:

$$RK = \frac{(Ej + Lj) - Aj}{Cj}$$

Where, Rk = Risk factor, Ej = Equity + Retained Earnings,

Lj = Long term Loans, Aj = Fixed Assets, Cj = Current Assets.

Based on the above formula, following inferences can be drawn:

Value of Rk is zero or less would mean that the firm is using the aggressive policy and normally the profitability would be high. Value of R is 1 or close to 1 would mean that the firm is using a conservative policy and the profitability would be low.

Table 19. Risk Vs. Profitability of LSC (2008-13).

Year	Equity (A)	Retained earnings (B)	A+B (1)	Long term loan (2)	Fixed assets (3)	Current assets (4)	Risk Factor (1+2-3)/4	Rank
2014	11,044,543	(944,130)	10,100,413	1,882,500	13,837,104	5,190,219	-0.3572	1
2013	8,380,747	(3,490,257)	4,890,490	1,698,641	14,611,362	3,912,006	-2.0507	2
2012	6,451,983	(5,343,728)	1,108,255	3,999,086	15,108,960	3,450,421	-2.8987	4
2011	2,768,479	(3,156,087)	(387,608)	4,960,752	15,597,208	2,317,596	-4.7567	6

As the risk factor value is less than zero in all the years from 2011 to 2014, it means the firm is using aggressive policy. The firm opts for a lower level of working capital thereby investing in current assets at lower proportion to total assets. When a firm adopts this policy, the profitability is high but at higher risk of liquidity. According to the table followed most aggressive policy in 2013 and it was also most profitable in 2013. If we compare the ranking of profitability ratios and risk factor it is same in four years. This clearly indicates that the risk and profit are positively correlated. We also test the correlation of risk factor with profitability and liquidity. Here is the result:

It is justified theory that risk and profit are positively correlated. Here in this paper the same concept has been proved in case of Aman, Crown, Cemex and Shah Cement Limited. But in case of the correlation between liquidity and risk there is no such established theory found. However, for Aman, Crown, Cemex and Shah there are also positive relation found between liquidity and risk in the study period.

As mentioned above, this study has made an attempt to examine the general financial health of Aman, Crown, Cemex and Shah Cement Limited through different ratio analysis. It is clear that

Table 20. Correlation of risk factor with liquidity & profitability.

Year	Average Liquidity Ratio	Average Profitability Ratio	Risk Factor
2014	2.1978	0.2899	-0.3572
2013	2.0572	0.2538	-2.0507
2012	1.6729	-0.1546	-2.8987
2011	2.1635	-0.2543	-4.7567
Correlation with Risk Factor	0.1320	0.7530	1.0000

this company's financial performance has fluctuated during the study period. Here are some major findings:

1. It is observed that's financial position throughout the study period is unsatisfactory. But the company is fighting well in its recovery period after 2014, when it faced the worst situation.
2. Z-score value of the last two years is the highest and much better than the other years.
3. The company has become more profitable too in the last four years in compare to the others.
4. Though the liquidity analysis shows that Aman, Crown, Cemex and Shah performance are not so good in recent years but the result is satisfactory.
5. The gross profit margin and net profit margin is surprisingly low. In one year EBIT was negative that means the production cost is too high.
6. This study predicts that the company has the chance of being insolvent in the near future.

The finding suggests that Aman Cement must be conscious to develop their financial position. It has to improve both its liquidity, profitability position to be solvent. The management of working capital should be strengthened, which helps to improve the financial position. The working capital and retained earnings was negative in all the years. Board of directors of the company should be very sincere about the controlling of cost. The cost of production is too high to create a gross profit margin. As it is a public company, shareholders will lose interest to purchase any share of the company if its financial position remain the same. It is high time to be more careful and take earliest prevention steps for the company to maintain the primary objective, going concern, of any business entity.

7.3. Profitability Ratios:**Gross Profit Margin**

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	11	13.56	13.51	12.69	1.4638	2.143
Crown	22.13	22.84	16.87	20.61	3.2612	10.635
Semex	21.98	21.46	19.89	21.11	1.0881	1.184
Shah	39.03	29.18	35.08	34.43	4.9571	24.573

Operating Profit Margin

Name of the cement company	2011-12	2012-13	2013-14	Mean	Industry Mean	S.D	C.V
Aman	3.92	5.27	5.32	4.84	10.72	0.7943	0.631
Crown	19.63	20.89	14.78	18.43	10.72	3.2260	10.407
Semex	18.09	16.47	15.18	16.58	10.72	1.4581	2.126
Shah	29.61	23.34	34.11	29.02	10.72	5.4092	29.259

Net profit margin

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	1.80	2.40	2.53	2.24	0.3894	0.152
Crown	13.31	11.13	7.83	10.75	2.7590	7.612
Semex	3.87	4.67	4.78	4.44	0.4967	0.247
Shah	(4.01)	(23.30)	(12.79)	(13.36)	9.6579	93.275

Return on asset

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	1.61	1.88	2.01	1.83	0.2040	0.042
Crown	9.00	8.27	5.00	7.42	2.1302	4.538
Semex	2.31	3.11	3.20	2.87	0.4899	0.240
Shah	(1.39)	(6.74)	(3.19)	(3.77)	2.7223	7.411

Return on equity

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	2.57	2.93	3.09	2.86	0.2663	0.071
Crown	20.72	32.93	19.48	24.38	7.4333	55.254
Semex	11.79	15.73	15.64	14.39	2.2492	5.059
Shah	(1.39)	(6.74)	(3.19)	-3.77	2.7223	7.411

Solvency Ratios

Debt to Asset

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.08	0.07	0.06	0.07	0.0100	0.000
Crown	0.30	0.31	0.24	0.28	0.0379	0.001
Semex	0.35	0.36	0.34	0.35	0.0100	0.000
Shah	0.74	0.76	0.74	0.75	0.0115	0.000

Times Interest Earned

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	(0.005)	0.04	0.08	0.0383	0.0425	0.002
Crown	0.019	0.04	0.104	0.0543	0.0443	0.002
Semex	(0.006)	0.047	0.080	0.0403	0.0434	0.002
Shah	0.018	(0.012)	(0.035)	0.0203	0.0266	0.001

Activity Ratio: Inventory Turnover

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	22.30	21.00	16.67	19.99	2.9478	8.689
Crown	4.09	4.26	2.76	3.70	0.8214	0.675
Semex	1.66	2.09	1.56	1.77	0.2816	0.079
Shah	1.52	1.16	1.74	1.47	0.2928	0.086

Receivables Turnover

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	2.03	2.32	2.45	2.27	0.2150	0.046
Crown	15.02	15.69	10.65	13.79	2.7370	7.491
Semex	3.70	5.01	5.60	4.77	0.9725	0.946
Shah	4.77	2.01	2.21	3.00	1.5390	2.369

Accounts Payable Turnover

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.35	0.32	0.31	0.33	0.021	0.001
Crown	1.14	1.18	0.92	1.08	0.140	0.019
Semex	0.60	0.61	0.75	0.65	0.084	0.007
Shah	2.03	2.45	2.33	2.27	0.216	0.047

Fixed Asset Turnover

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.35:1	0.40:1	0.46:1	0.40:1	0.055	0.003
Crown	0.66:1	0.96:1	1.56:1	1.06:1	0.458	0.211
Semex	0.58:1	0.74:1	1.04:1	0.79:1	0.234	0.055
Shah	1.04:1	1.16:1	0.61:1	0.94:1	0.289	0.084

Total Asset Turnover

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.89	0.76	0.79	0.81	0.0681	0.005
Crown	0.68	0.74	0.64	0.69	0.0503	0.003
Semex	0.60	0.67	0.67	0.65	0.0404	0.002
Shah	0.35	0.29	0.25	0.30	0.0503	0.003

Liquidity Ratios: Current ratio

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	1.26:1	1.51:1	1.74:1	1.08:1	0.241	0.058
Crown	1.05:1	1.09:1	1.21:1	1.12:1	0.083	0.007
Semex	0.98:1	1.13:1	1.19:1	1.10:1	0.108	0.012
Shah	1.27:1	0.98:1	0.92:1	1.06:1	0.187	0.035

Quick ratio

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	1.06:1	1.31:1	1.47:1	1.28:1	0.207	0.043
Crown	0.58:1	0.66:1	0.69:1	0.64:1	0.057	0.003
Semex	0.35:1	0.34:1	0.18:1	0.29:1	0.096	0.009
Shah	0.68:1	0.52:1	0.57:1	0.59:1	0.082	0.007

Cash Ratio

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.03:1	0.01:1	0.02:1	0.29:1	0.42	2.03
Crown	0.02:1	0.03:1	0.03:1	0.06:1	0.01	0.45
Semex	0.01:1	0.01:1	0.01:1	0.02:1	0.01	0.63
Shah	0.01:1	0.01:1	0.01:1	0.02:1	0.01	0.63

Cash flow from operating ratio

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.35:1	0.40:1	0.46:1	0.40:1	0.055	0.003
Crown	0.66:1	0.96:1	1.56:1	1.06:1	0.458	0.211
Semex	0.58:1	0.74:1	1.04:1	0.79:1	0.234	0.055
Shah	1.04:1	1.16:1	0.61:1	0.94:1	0.289	0.084

Z – Test Ratio: Analysis of Z-score

Name of the cement company	2011-12	2012-13	2013-14	Mean	S.D	C.V
Aman	0.907	0.779	0.810	0.832	0.067	0.005
Crown	0.690	0.754	0.761	0.735	0.039	0.002
Semex	0.602	0.683	0.680	0.655	0.046	0.002
Shah	0.354	0.290	0.251	0.298	0.052	0.003

8.0. Conclusion

The fundamental financial health of a business firm is the main concern for the stakeholders. On the basis of the financial soundness, they take a decision regarding their possible involvement with a particular firm. The Altman Z score is the best measurement that can shape the decision of the stakeholders. The current study has been conducted to assess the financial health of the firms under the cement industry of Bangladesh. The study revealed that among the four firms, two (Aman and Shah) are financially sound as they have higher Z score than the benchmark (2.99). Another firm that is Crown is in the gray area that is the firm is financially sound, but the management requires special attention to improve the financial health of the organization. Otherwise, the firm may face financial distress in the long run. The other two firms are at serious risk of financial distress. Thus, the management should take necessary steps to reverse the situation, and the general investors should be careful in investing in the stocks of these companies. So, the findings of the study can be useful for the managers to take financial decision, the stockholders to choose investment options and others to look after their interest in the concern cement manufacturers of the country.

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