

A Z-Score Analysis on Working Capital Management Of The Selected Listed Cement Indian Companies

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ABSTRACT

Working capital refers to the management of cash requirements during the period of conversion of raw material into goods and receipts of cash from selling the goods to the customers. Working capital cycle can be comprehended as a blend of operating requirement (operating cycle) and sales requirement (cash cycle). A discriminant analysis for the period 2007 to 2010 was conducted to predict whether the selected cement companies were well-managed or poorly managed in terms of working capital (WC). Two predictor variables namely ratio of monthly net working capital to monthly operating working capital and ratio of monthly net working capital to monthly sales were used in the study. Significant mean differences were observed for all the predictors for all the years on the dependent variable. Log determinants were quite similar across the time series. Assumption of equality of covariance matrices was indicated through Box's M. The discriminate function revealed a significant association between groups and all predictors accounted for at least 40% of between group variability. The 'jack-knife' (cross validated) classification showed that overall more than 84% were correctly classified across the time horizon. Simply the current ratio analysis on the data pertaining to the year 2004, 2005, 2006, 2011 and 2012 was performed as it was statistically not supported for the application of discriminant analysis.

Keywords: Cement Sector, Discriminant Model, Ratio Analysis, Working Capital Management

JEL Classification: C3, C32, L6, L61

Introduction

Working capital is like a blood for the business. It is a significant facet of financial management. Two major components of working capital comprises of current assets which represents the major portion of total investment. Purchase of current assets represents cash outflow. To run the business smoothly cash outflow should be matched with cash inflow. Investment in current assets and the level of current liabilities have to be geared quickly to cast change in sales and thereby assuring cash inflow in the business. Capital intensive companies like cement, steel, infrastructure etc requires good level of working capital to be maintained to bring attractive earnings to shareholders. Optimization of working capital balance means minimizing the working capital requirements and realizing maximum possible revenues (Kala, 2011). The efficient working capital management is the most

crucial factor in maintaining survival, liquidity, solvency and profitability of the concerned business organization.

The short term funds required to run the business operations are referred as working capital or 'circulating capital' or 'current capital'. In other words it refers to the firm's investment in short-term assets. There are two schools of thoughts that advocate the concept of working capital as quantitative and qualitative. Quantitative concept advocates the total of all current assets, which is often referred as gross working capital. Qualitative concept explains the difference of current assets over current liabilities, which is treated as net working capital. If the objective is to measure the size and extent to which current assets are being used, 'Gross concept' is useful; whereas in evaluating the liquidity position of an undertaking

'Net concept' becomes pertinent and preferable. Managing working capital cycle is a circular, consistent and repetitive process (Chandra, 2001).

Literary Work in Working Capital Management

Under the 'conservative policy' the investment in current assets is high. The firm maintains a huge balance of cash and marketable securities carries large amount of stock and offers flexible credit to the customers. Under the 'aggressive policy' the investment in current assets is low. The firm keeps small balance of cash, marketable securities, stock and offers stiff terms of credit to the customers (Chandra, 2001). Chandra (2011) pointed that flexible policy results in fewer production stoppages, ensures quick deliveries to customers and stimulates sales due to liberal credit, which comes at a cost of higher investment in current assets. A restrictive policy leads to frequent production stoppages, delayed deliveries to customers and loss of sales, which the firms may have to bear to keep its investment in current assets low. It was noted in the literary work that firms in Pakistan followed conservative working capital management policy and they needed to concentrate and improve individual components of working capital. Moreover efficient management and financing of working capital may increase the profitability of manufacturing firms (Raheman, Afza, Qayyum, & Bodla, 2010). A study by authors of Pakistan namely Saghir, Hashmi and Hussain (2011) empirically explained that there was statistically negative significance between profitability measured on return on assets and cash conversion cycle, it was suggested that profit could be availed by the companies if cash conversion cycle and number of days for collection and payment to an optimum level could be maintained.

It was depicted in the work of Mohamad and Saad (2010) that WC should be strategically well managed to ensure a firm's improvement in market value and its profitability. Ramchandran and Janakiraman (2009) studied the relationship between WC management efficiency and earnings before interest and tax for paper industry of India during 1997-2006 and concluded that less profitable firms waited longer to pay their bills and pursue a decrease in cash conversion cycle. Pasupathi (2012) made a comprehensive study on

operational adequacy of WC management of selected Indian automobile industry and concluded that in the study period of 1992-2007 Ashok Leyland Ltd, Mahindra and Mahindra Ltd and Bajaj Auto Ltd maintained adequate size of working capital in relation to sales and output requirements through out the period under the study. Kala (2011) studied the working capital management efficiency of selected Indian cement companies. It was found that WC management efficiency was negatively associated to the profitability and liquidity. It was suggested that the cement company should improve working capital management efficiency by concentrating on reducing inventory and improving day's payable outstanding by getting more credits from suppliers.

Research Objective

1. To understand the phenomena of working capital cycle.
2. To examine the literary work in working capital management.
3. To carry out Z-Score i.e. Discriminant Analysis for a time horizon of 9 years (i.e. 2004-2012) with respect to the selected Indian Cement companies which are listed on bourses of Bombay Stock Exchange (BSE) and National Stock Exchange (NSE).

Research Methodology

Descriptive research design had been used in the study. Non probability purposive sampling technique was used for deciding the appropriate sample size. A sample of 19 listed cement companies was selected for the study. Sampling element mainly consisted of BSE and NSE listed cement companies. Sampling unit comprised of listed cement companies for which the data was available for more than 8 years. The data of listed cement companies used in the study were Associated Cement Company Ltd., (ACC), Ambuja Cements Ltd., Andhra Cements Ltd., Barak Valley Cements Ltd., Birla Corporation Ltd., Burnpur Cement Ltd., India Cements Ltd., J.K Cements Ltd., KCP Cement Ltd., Lakshmi Cements Ltd., Madras Cements Ltd., Mangalam Cement Ltd., Panyam Cements Ltd., Prism Cements Ltd., Rain Cements Ltd., Saurashtra Cement Ltd., Shree Cement Ltd., Shree Digvijay Cement Ltd. and Ultratech Cement Ltd. The period starting from 2004 to 2012, (i.e. 9 years) was sample duration for collecting the

secondary data of cement companies for the study. Time series data on annual basis for 6 variables such as stock, debtors, cash, other current assets, current liabilities, and sales was collected for the study. Using the data of available variables total current assets, net working capital (NWC), monthly net working capital (MNWC), operating working capital (OPWC), monthly operating working capital (MOPWC), ratio of monthly NWC (MNWC) to monthly OPWC (MPOWC), monthly sales (MS), ratio of monthly NWC (MNWC) to monthly sales (MS) and current ratio was computed for the study. Thus cross sectional data for 19 cement companies with respect to 9 years time horizon and 15 variables were used in the background of the study. Data was retrieved from Ace Analyzer database. Data was managed through Microsoft Excel 2007 and it was analyzed using SPSS 19. Various secondary sources like books, journals and websites were referred for gauging clarity on the topic and examining the literary work performed in the field of working capital. Inferential statistics like discriminant (Z-score) analysis was performed on the data to classify the practices adopted by companies in managing working capital. It was observed that the data pertaining to 4 consecutive years i.e. 2007, 2008, 2009 and 2010, was statistically supporting the application of discriminant analysis, so the Z-score analysis was performed on 19 companies only for 4 years time horizon. Data pertaining to the year 2004, 2005, 2006, 2011 and 2012 did not statistically support the application of discriminant analysis, so on that data primary current ratio analysis and interpretation was performed. The major limitation of the study was that more companies could have been taken for study. Time horizon could have been expanded. Similar type of study can be applied across various sectors.

Phenomena of Working Capital

Investments in current assets should be adequate to the needs of the business firm. Excessive investment in current assets should be avoided because it impairs the firm's profitability, as idle cash generates nothing. Inadequate amount of working capital can threaten solvency of firm because of its inability to meet the current obligations (Kumari, 2013). The components of current assets are stock, debtors, loans and advances and cash and bank balances. Current

liabilities mainly consist of creditors, trade advances and short term borrowings (Chandra, 2001).

In normal parlance it may be inferred that cash is used for acquiring raw material; raw materials are transformed into finished goods; (this transformation may involve several stages of work-in-process); finished goods, generally sold on credit, are converted into accounts receivable; and finally account receivable, on realization, generate cash (Chandra, 2001). In a nutshell working capital is mainly composed of current assets (closing stock, debtors, loans & advances and cash and bank balances) and current liabilities (creditors, trade advances and short term borrowings). Chandra (2001) critically explained that investment in WC is dependent on chief events in production cycle (purchase of raw materials and payment of raw materials) and sales cycle (sale of finished goods and collection of cash for sales). The firm begins with the purchase of raw materials which are paid for after a delay which represents the accounts payable period. The firm converts the raw materials into finished goods and then sells the same. The time lag between the purchase of raw materials and sale of finished goods is the inventory period. Customers pay the bills some time after the sales. The period that elapses between the date of sales and the date of collection of receivables is the account payable period (Chandra, 2011). Further it was highlighted that the time that elapses between the purchase of raw materials and collection of cash for sales is referred to as the operating cycle, whereas the time length between the payment for raw material purchases and the collection of cash for sales is referred as the cash cycle. In a nutshell the operating cycle is the sum of the inventory period and the accounts receivable period, whereas the cash cycle is equal to the operating cycle less the accounts payable period (Chandra, 2011). In other words the working capital cycle can be broken in two parts viz., operating requirement (operating cycle) and sales requirement (cash cycle).

Findings and Discussion

The findings of the study is divided mainly in two sections viz., Section I represents the Discriminant Analysis and Section II signifies the fundamental analysis based on current ratio.

Section I- Discriminant Analysis

Linear discriminant analysis was applied using only two sets of independent variables. The sampled units were classified in two categories as per their current ratio. Group A was formed of those companies whose current ratio was found to be at least 1.5:1, these companies were treated as good companies in terms of liquidity. Group B comprised of those companies whose current ratio was less than 1.5:1, these companies were treated to be poor companies in terms of liquidity. The classification list of the same is mentioned in Table 1. In the study the companies classification as 'Good or Poor' based on current ratio was treated as dependent variable and ratio of monthly net working capital to monthly operating working capital requirement (MNWC/MPOWC) and ratio of monthly NWC (MNWC) to monthly sales (MS) (MNWC/MS) have been treated as independent variables. Ratio of MNWC/MPOWC and ratio of MNWC/MS was assumed as X1 and X2 variables respectively. The primary object was to determine weights for X1 and X2, that is values of 'a' and 'b' in the equation $Z = X1a + X2b$, where Z represents the discriminant index.

From table 2 it may be inferred that difference between operational working capital requirement and sales requirement were found to be significant which suggests that it may be a good source of discrimination as separations and standard deviation (SD) were found to be large. From table 3, it may be inferred that there was a presence of strong statistical evidence of significant difference between the means of 'good' and 'poor' companies with respect to operational and sales requirement, which existed with high value of F's and the significant value for all cases were less than p-value (i.e.0.05 - the assumed level of significance). The correlation matrices for all predictor variables were examined to detect the problem of multi-collinearity. It was also noticed that the correlation co-efficient between any pair of predictor variable was not greater than 0.75, indicating low inter-correlations, thereby avoiding the problem of multi-collinearity. A hypothesis was framed to test the Box M's, if covariance matrices differed between the groups.

H₀₁: Covariance matrices do not differ between groups formed by the dependent.

H₁₁: Covariance matrices differ between groups formed by the dependent.

From table 4 it was noticed that for the year 2007 as the p-value > sign. value, H₀ holds and for rest of the years p-value < sign. value, so H₁ holds the premise of statistical significance. The discriminant hypothesis was framed to perform the discriminant analysis.

H₀₂: The means of all discriminant functions in all groups are equal.

H₁₂: The means of all discriminant functions in all groups are not equal.

From table 5 it was observed that the Eigen values in all cases was above 1. Variance explained by model was 100% and variation in the grouping variable as explained by the model was found to be above 40%. Thus, it may be inferred that the means of all the discriminant function in all groups are not equal. Thus, discriminant function was highly significant function (p<0.05) and it also provided the proportion of total variability not explained by the model. So company being referred as 'good' or 'poor' with respect to variance in the discriminatory model was due to the changes in two predictor variables viz., monthly operational requirement and monthly sales requirement.

The unstandardized co-efficients were used to create the discriminant function (equation). The discriminant function of the selected years were estimated and presented in table 6, where the co-efficient for 'a' and 'b' indicated the size of net working capital with respect to ratio of MNWC to MPOWC and ratio of MNWC to MS. It was noticed that sales requirement was stronger than operational requirement for determining the size of working capital for the year 2007 to 2009. Only for the last year i.e. 2010 operational requirement outperformed the sales requirement in terms of determining the size of working capital. Thus it could be comprehended that during the discriminant study period especially for the year 2007 to 2009, companies performed well in terms of management of working capital. The companies effectively churned its current assets to convert it into sales, thereby less requirement of working capital. In the year 2010, companies' working capital requirement exceeded, and its conversion

cycle of current assets to generate sales considerably went down.

The discriminant co-efficient of table 6 was multiplied with the individual mean values of each industry ratio to obtain the discriminant score of each unit. In table 7 the data relating to the discriminant score of all the units were mentioned. With the help of the discriminant score, the cut-off value was calculated using the following formula:

Cut -off Value = $N_1Z_1 + N_2Z_2 / (N_1+N_2)$, where, Z_1 and Z_2 represented the mean discriminant score of group one (good) and group two (poor) respectively. N_1 and N_2 represented the size of the sample of group 1 and group 2 respectively.

For the year 2007, from the table 7 it was evident that the discriminant Z-score was 1.392, when this score was used as a benchmark to compare other companies it was noticed that for Rain Cements, the size of WC was found to be very low considering the monthly operational and sales requirement. Panyam, Prism, Birla, Saurashtra, Ultratech, Digvijay cements followed the list of poorly managed WC. In the case of other companies WC was well-managed. For 2008, it was evident that the cut-off Z-score was 0.845 for well-managed companies. The Z-score was -0.939 for poorly managed company. Eight companies namely Ambuja, Barak Valley, Burnpur, KCP, Lakshmi, Mangalam, Shree Cement and Digvijay cements, the size of WC was found to be adequate considering the operational and sales requirement.

For 2009, the Z-score for 'good' classification was 1.029. It was noticed that Ambuja, Birla, Burnpur, KCP, Lakshmi, Mangalam and Shree Cement managed their WC requirement sufficiently, when evaluated with their operational and sales requirement. For rest of the companies it was noticed that they failed to effectively manage the WC and thus came under 'poorly' managed WC list. For 2010, the Z-score of 'good' and 'poor' companies stood at 0.821 and -1.407 respectively. The list of poorly managed company had prune down in the year 2010. Only five companies out of 19 companies faced the dearth of WC management. The companies which failed to manage the WC adequately were Andhra, ACC, India, Saurashtra and Ultratech cement. Rest of the 14 companies effectively managed their WC.

Section II Fundamental Analysis Using Current Ratio

For 2004 only five companies namely JK, Lakshmi, Manglam, Barak and Shree cements had current ratio, at least to the benchmark level i.e. 1.5:1. For 2005, Ambuja, Madras, Lakshmi, KCP, Manglam, Barak, Burnpur and Shree cements had current ratio exceeding 1.5:1. In 2006 Ambuja, JK, Lakshmi, KCP, Manglam, Barak, Burnpur and Shree cements scored higher in terms of current ratio level. Companies like Ambuja, Birla, Manglam, Burnpur and Rain cement were successful in maintaining the higher level of current ratio in 2011. For 2012 only Ambuja, Birla and Manglam maintained higher level of current ratio.

Conclusion

Where the individual positive score was above positive Z-score it was inferred that WC was found in excess of the cut-off Z-score. Where the individual positive score was nearer to Z-score, it may be concluded that WC was satisfactorily managed. Where, the individual negative score was ahead of negative Z-score, it indicated that WC status was very poor in such companies. A bleak WC situation may be pictureized for such companies. From table 8 i.e. classificatory table or confusion matrix, it could be clearly depicted that comparison of manual classification and classification as per discriminant score was made and the hit ratio as well as cross validated cases percentage was mentioned.

From table 9 it may be inferred that Ambuja, Burnpur, KCP, Lakshmi, Mangalam and Shree cement companies adequately and consistently managed the size of WC in relation to sales requirement and operational requirement throughout the time series of 2007 to 2010. Andhra, Saurashtra and Ultratech cement consistently scored 'poor' nomenclature in terms of WC requirement with respect to operational and sales aspect. Some companies after certain time duration were either categorized as 'consistent poor' or 'consistent good'. Consequently 'poor companies' were ACC (2008-10), Birla (2007-08), India cement (2008-10), Madras cement (2007-09), Panyam (2007-09) and Prism (2007-09). Barak valley and Birla were consecutively rated as 'good' in terms of WC for 2007-08 and 2009-10 respectively.

It was clear from table 9 that the misclassification of units were noticed in all the years. Units in 'good' group had been misclassified as belonging to 'poor' group and vice-versa under the criteria of discriminant score. ACC in 2007 was classified from 'poor to good' group and JK was classified from 'good to poor' group. In 2008, JK and Rain cements were classified from 'good to poor' group. In 2009 only one company i.e. Barak Valley was misclassified from 'good to poor' list. In 2010 JK was treated from 'poor to good' group and Prism cement was treated from 'poor to good' list. A volatile classification was seen for Shree Digvijay cement, its status in 2007 was poor, in 2008 it became good, then in 2009 it was poor and finally it settled in 2010 at 'good' position. Thus, alternate poor-good classification was noticed.

Rain cements was manually classified in 'poor' list in 2007, misclassified as 'poor' in 2008, correctly classified as 'poor' and 'good' in 2009 and 2010 respectively. In the last year company managed to maintain its WC. A striking thing was noticed for Panyam cement, it was consistently classified in 'poor' list, from 2007 to 2009 and in 2010, and it entered the 'good' list group, which meant that WC was well managed. Similar was the case with Madras cements.

A controversial discrepancy existed for JK cements. It was manually classified as 'good' from 2007 to 2008, whereas discriminant classification showed it in 'poor' list for three consecutive years i.e. 2007, 2008 and 2009. In 2010 it came under 'good' list. Barak valley after consecutively rated as 'good' for 2007 and 2008, it was misclassified as 'poor' in 2009 and finally treated in 'good' list in 2010.

A closer scrutiny of data pertaining to 2004, 2005, 2006, 2011 and 2012, on which discriminant analysis was not performed was analyzed through benchmark current ratio criteria of 1.5:1. A further analysis highlighted that in some cases there was surplus idle cash lying with the company which was responsible for higher current ratio. Companies whose current ratio was higher due to higher level of inventory, suggested that companies adopted 'stocking' approach to avoid a run of 'out of stock' situation. Companies, whose current ratio was high on account of higher level of debtor's component, highlighted that such companies sold good

quantum of goods on credit, which may turn-out to be dangerous in the long run. An ideal working capital management is the one which results in meager requirements of cash.

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List of Tables

Table 1 Classification of Good and Poor Risk Cement Companies Based On Current Ratio

Year	2007	2008	2009	2010
Group A (Good, $CR \geq 1.5:1$)	AML, BVL, BCL, ICL, JKL, KCPL, LL, MAL, SHCL	AML, BVL, BCL, JKL, KCPL, LL, MAL, RCL SHCL, SDCL	AML, BVL, BL, BCL, KCPL, LL, MAL, SHCL	AML, BVL, BL, BCL, KCPL, LL, MCL, MAL, PACL, RCL, SHCL, SDCL
	N1= 9	N1= 10	N1= 8	N1= 12
Group B (Poor, $CR < 1.5:1$)	ACCL, ANL, BL, MCL, PACL, PCL, RCL, SCL, SDCL, UCL	ACCL, ANL, BL, ICL, MCL, PACL, PCL, SCL, UCL	ACCL, ANL, ICL, JKL, MCL, PACL, PCL, RCL, SCL, SDCL, UCL	ACCL, ANL, ICL, JKL, PCL, SCL, UCL
	N2= 10	N2= 9	N2= 11	N2= 7
ACCL- Associated Cement Company Ltd., AML- Ambuja Cement Ltd., ANL- Andhra Cement Ltd., BVL- Barak Valley Cement Ltd., BL- Birla Corporation Ltd., BCL- Burnpur Cement Ltd., ICL- India Cement Ltd., JKL- J.K. Cement Ltd., KCPL- KCP Cement Ltd., LL- Lakshmi Cement Ltd., MCL- Madras Cement Ltd., MAL- Mangalam Cement Ltd., PCL- Prism Cement Ltd., PACL- Panyam Cement Ltd., RCL- Rain Cements Ltd., SCL- Saurashtra Cement Ltd., SHCL- Shree Cement Ltd., SDCL- Shree Digvijay Cement Ltd., UCL- Ultratech Cement Ltd.				

(Source: Author's Compilation)

Table 2 Group Statistics

Type of Company	Parameter	2007		2008		2009		2010	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Good	MNWC/MPOWC	0.96	0.62	1.11	1.10	1.27	0.81	0.87	0.39
	MNWC/MS	0.17	0.12	0.22	0.21	0.26	0.30	0.22	0.31
Poor	MNWC/MPOWC	-0.17	0.54	-0.19	0.62	-0.34	1.01	-0.58	0.96
	MNWC/MS	-0.02	0.10	-0.01	0.06	-0.07	0.22	-0.05	0.10

(Source: SPSS Output)

Table 3 Test of Equality of Group Means and Correlation

Particulars	2007		2008		2009		2010	
	Operational Requirement	Sales Requirement	Operational Requirement	Sales Requirement	Operational Requirement	Sales Requirement	Operational Requirement	Sales Requirement
Wilk's Lambda	0.48	0.55	0.64	0.62	0.55	0.70	0.44	0.77
F	18.58	13.74	9.71	10.47	13.73	7.40	21.95	5.22
Df ₁	1	1	1	1	1	1	1	1
Df ₂	17	17	17	17	17	17	17	17
Sign.	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.04
Correlation in group matrices	-0.02		0.34		0.53		0.48	

(Source: SPSS Output)

Table 4 Box's M Test Statistics

Particulars	2007	2008	2009	2010
Box M	2.68	30.32	50.54	27.07
Sig.	0.51	0.00	0.00	0.00
Decision	Statistically not significant	Statistically significant	Statistically significant	Statistically significant

(Source: SPSS Output)

Table 5 Test Statistics for Eigen Value and Wilk's Lambda

Particulars	2007	2008	2009	2010
Eigen Value	1.95	1.02	1.04	1.29
% of Variance	100	100	100	100
Canonical Correlation	0.81	0.69	0.68	0.75
Variation in grouping variables explained by model	65.61%	47.61%	46.24%	56.25%
Wilk's Lambda	0.34	0.53	0.54	0.44
Sign.	0.00	0.00	0.00	0.00

(Source: SPSS Output)

Table 6 Discriminant Function for 2007 to 2010

Year	Discriminant Function	Remarks
2007	$Z = 1.332a + 6.029b - 0.902$	a < b
2008	$Z = 0.647a + 4.075b - 0.781$	a < b
2009	$Z = 0.881a + 1.080b - 0.377$	a < b
2010	$Z = 1.534a + 0.035b - 0.518$	a > b

(Source: SPSS Output)

Table 7 Z-Score Values for the Selected Cement Companies (2007-2010)

Cement Companies	2007	2008	2009	2010
Ambuja Cement Ltd.	1.15	0.48	0.42	1.57
Andhra Cement Ltd.	-0.9	-0.36	-0.6	-2.66
Associated Cement Company Ltd.	0.22	-0.43	-0.61	-0.69
Barak Valley Cements Ltd.	2.08	0.19	0.2	0.39
Birla Corporation Ltd.	-1.33	-0.97	0.6	0.93
Burnpur Cement Ltd.	0.4	3.01	1.54	1.91
India Cement Ltd.	0.92	-0.37	-0.73	-0.82
J.K. Cement Ltd.	0.05	-0.55	-0.34	-0.52
KCP Cement Ltd.	2.18	0.78	0.78	0.7
Lakshmi Cements Ltd.	2.39	2.8	2.39	1.21
Madras Cement Ltd.	-0.68	-0.55	-0.01	0.03
Mangalam Cement Ltd.	1.16	0.22	0.53	1.08
Panyam Cement Ltd.	-3	-1.06	-0.26	0.07
Prism Cement Ltd.	-1.66	-1.2	-0.47	-0.39
Rain Cements Ltd.	-3.16	-0.26	-0.52	0.74
Saurashtra Cement Ltd.	-1	-2.39	-4.09	-4.23
Shree Cement Ltd.	2.19	1.61	1.75	1.13
Shree Digvijay Cement Ltd.	-0.01	0.18	-0.06	0.09
Ultratech Cement Ltd.	-1	-1.13	-0.53	-0.54
Z-Score Cut-off Value at group centroids (Good)	1.392	0.845	1.029	0.821
Z-Score Cut-off Value at group centroids (Poor)	-1.252	-0.939	-0.746	-1.407

*(Source: SPSS Output)***Table 8 Classificatory Table (2007-2010)**

Year	As Per Current Ratio			As Per Discriminant Score			Hit Ratio	Cross Validated Grouped Cases
	Good	Poor	Total	Good	Poor	Total		
2007	9	10	19	8	9	17	89.50%	89.50%
2008	10	9	19	8	9	17	89.50%	89.50%
2009	8	11	19	7	11	18	94.70%	89.50%
2010	12	7	19	12	5	17	89.50%	84.20%

(Source: Excel Computed SPSS Output)

Table 9 Cross Comparison of Manual Classification Vs. Discriminant Classification

Cement Companies	2007		2008		2009		2010	
	M	D	M	D	M	D	M	D
Ambuja Cement Ltd.	G	G	G	G	G	G	G	G
Andhra Cement Ltd.	P	P	P	P	P	P	P	P
Associated Cement Company Ltd.	P	G	P	P	P	P	P	P
Barak Valley Cements Ltd.	G	G	G	G	G	P	G	G
Birla Corporation Ltd.	P	P	P	P	G	G	G	G
Burnpur Cement Ltd.	G	G	G	G	G	G	G	G
India Cement Ltd.	G	G	P	P	P	P	P	P
J.K. Cement Ltd.	G	P	G	P	P	P	P	G
KCP Cement Ltd.	G	G	G	G	G	G	G	G
Lakshmi Cements Ltd.	G	G	G	G	G	G	G	G
Madras Cement Ltd.	P	P	P	P	P	P	G	G
Mangalam Cement Ltd.	G	G	G	G	G	G	G	G
Panyam Cement Ltd.	P	P	P	P	P	P	G	G
Prism Cement Ltd.	P	P	P	P	P	P	P	G
Rain Cements Ltd.	P	P	G	P	P	P	G	G
Saurashtra Cement Ltd.	P	P	P	P	P	P	P	P
Shree Cement Ltd.	G	G	G	G	G	G	G	G
Shree Digvijay Cement Ltd.	P	P	G	G	P	P	G	G
Ultratech Cement Ltd.	P	P	P	P	P	P	P	P

(Source: Compiled from SPSS Output and Manual Classification)

(M-Manual Classification, D- Discriminant Classification, G-Good, P-Poor)