



WORKING CAPITAL MANAGEMENT: A STUDY ON INDIAN CEMENT COMPANIES

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Abstract

Corporate finance deals with mainly three aspects of financial decision making – capital budgeting, capital structure and working capital management. While the former two focus on financing and managing long-term investment decisions, the latter deals with the management of short-term capital requirements of the firm. Genestenberug, “Circulating capital means current assets of a company that are changed in the ordinary course of business from one form to another, as for example, from cash to inventories to receivables into cash”. Working capital is an important component of the capital of a firm that helps to carry out the day-to-day activities. Working Capital affects both the liquidity and profitability. Liquidity plays a significant role in successful functioning of an entity and maximising its Profit. Increasing profits at the cost of liquidity can create detrimental effect to a firm. Liquidity ensures that a firm is able to meet its short-term obligations and its continuous flow assures firms profitability. Conversely, firm that has low liquidity faces high risk which results to high profitability. For these reasons working capital management should be given proper consideration and one should try neither to maximize nor minimize the liquidity ratios; one should always try to optimize the liquidity of a firm. Efficient management of working capital is a fundamental part of the overall corporate strategy in creating shareholders’ value.

Keywords: Indian Cement Sector, Operating Profit Margin, Net Profit Margin, Current Ratio, Liquid Ratio, Working Capital Turnover, Inventory, Debtors, Creditors Turnover, Cash Cycle.

Introduction

Indian Cement Industry has the second largest market in the world after China. By the end of 2016, it had a total manufacturing capacity of about 384 million tonnes (MT). Cement is a cyclical commodity with a high correlation with GDP. The demand for cement in real estate sector is spread across rural housing (40%), urban housing (25%) and construction/infrastructure/industrial activities (25%). While the rest 10% demand is contributed by commercial real estate sector. The growth in the Real Estate sector has played a positive role behind the development in the Cement Sector. Cement demand is expected to reach 550 to 600 Million Tonnes Per Annum (MTPA) by 2025.

India’s Leading Cement Companies

Ultratech Cement: Headquartered in Mumbai, Ultra-Tech Cement Ltd was founded in 1983. It has a production capacity of 93 million tonnes per annum (MTPA) of grey cement. It operates across India, Bangladesh, Bahrain, UAE, and Sri Lanka. For white cement segment, it adopts the brand name of Birla White.

ACC: Headquartered in Mumbai, Associated Cement Companies Limited was founded in 1936. It is the second largest Indian cement company with annual production capacity of 33.42 million tonnes. It operates with more than 40 ready mix concrete plants, 21 sales offices, and several zonal offices.

Ambuja Cement: Headquartered in Mumbai, Ambuja Cements Ltd was founded in 1983 and started its production in 1986. It is the third largest Indian cement company with annual production capacity of 29.65 million tonnes. It has 5 integrated cement manufacturing plants and 8 cement grinding units.

Shree Cements: Headquartered in Kolkata, Shree Cements Limited was founded in 1979 in Bewar in the Ajmer district of Rajasthan. It is the fourth largest Indian cement company with annual production capacity of 13.5 million tonnes. It has 6 cement manufacturing plants located at Beawar, Ras, Khushkhera, Jobner (Jaipur) and Suratgarh in Rajasthan and Laksar (Roorkee) in Uttarakhand.

Ramco Cement: Headquartered in Chennai Ramco was founded in 1984. It is the fifth largest Indian cement company with annual production capacity of 16.45 million tonnes. It has 8 manufacturing plants including grinding unit. It also produces Ready Mix Concrete and Dry Mortar products.

India Cements: Headquartered in Tirunelveli, The India Cements Limited was founded in 1946. It is the sixth largest Indian cement company with annual production capacity of 15.5 million tonnes. It manufactures cement for various applications, including, precast concrete items, concrete components, and multi-storey buildings, as well as runways, concrete roads, bridges and for general-purpose use. It has 8 integrated cement plants and 2 grinding units.



Prism Cement: Prism Cement Limited is India's 8th leading integrated Building Materials Company, with a wide range of products from cement, ready-mixed concrete, tiles, and bath products to kitchens. The company has three Divisions Prism Cement, H & R Johnson (India), and RMC Readymix (India).

Binani Cement: Headquartered in Mumbai, Binani was founded in the year 1872. It is the seventh largest Indian cement company with annual production capacity of 11.25 million tonnes. It has 2 integrated plants, one in India and another in China, and grinding units in Dubai.

Birla Corp: M.P Birla is one of the top Industrial groups in India. It offers wide range of products including auto interiors, cables, jute, cement etc. The group include companies like Vindhya Telelinks Ltd, Universal-ABB Power Cables Ltd, Universal Cables Ltd, Hindustan Gum & Chemicals Ltd etc.

Jk Cement: Headquartered in Mumbai, J.K Cement Ltd was founded by Lala Kamlapat Singhania. It is one of the top manufacturers of white cement in India. It has 3 cement production plants located in Karnataka, Andhra Pradesh, and Maharashtra. It produces 2 types of cements namely Portland Slag Cement, Ordinary Portland Cement and Ground Granulated Blast Furnace Slag.

Objective of the study

1. To analysis the profitability position of some selected Cement Companies like Ultratech Cement, ACC, Ambuja Cement, Shree Cement, India Cement, Prism Cement, Binani Cement, Ramco Cement, Birla Corp, JK Cement.
2. To highlight the financial performance and return of the selected companies using Profitability Ratios, Working Capital Ratios, Liquidity Ratios.

Review of Literature

The researcher and economists have recognized that the measurement of profitability in Cement Sector is necessary to analyse and improve the financial performance of the sector. A large number of studies have been conducted in the field of operation and financial performance of Cement Companies. A brief review of some of these studies has been presented.

Grabrowsky (1976), a significant relationship between various success measures and the employment of formal working capital policies and procedures was found. Cash conversion cycle and cash flow management plays vital role for overall financial management of all firms, especially those which are capital constrained and more reliant on short-term sources of finance.

Narasimhan & Murty (2001), focus on improving return on capital employed by targeting some critical areas such as cost containment, reducing investment in working capital and improving working capital efficiency.

Shin & Soenen (1998) studied the effect of working capital management on corporate profitability using sample of 58,985 firm years covering the period 1975-1994. They examined the relationship between firm's net trade cycle and its profitability and found a strong negative relationship. They also found that shorter net trade cycles are associated with higher risk adjusted stock returns.

Deloof (2003) studied effect of working capital management on Belgian firms' profitability. He used gross operating income as a measure of profitability and found significant negative relation between gross operating income and the number of days accounts receivable, inventories, accounts payable. He also suggested that less profitable firms wait longer to pay their bills hence negative relationship between accounts payable and profitability.

Raheman & Nasr (2007) analysed different variables of working capital management on firms listed on Karachi Stock Exchange. They used net operating profit as a measure of profitability. Along with measures of working capital management including average collection period, inventory turnover ratio, average payment period and cash conversion cycle they includes current ratio as a measure of liquidity and found it to be most important liquidity measure that affects profitability.

A. Ajanthan (2013) studied the relationship between liquidity and profitability of trading companies in Sri Lanka using current and quick ratio for liquidity and return on equity and return on asset for profitability. He found significant impact of liquidity on profitability.



Chandra Kartik (2012) in his paper on “Trends in Liquidity Management & impact on profitability”: states that the selected companies always try to maintain adequate amount of net working capital In relation to Current Liability so as to maintain a good amount of liquidity.

Eljelly (2004) examined the liquidity-profitability trade-off on sample of firms in Saudi Arabia. He found significant negative relationship between liquidity, measured by current ratio, and profitability. He also found negative relationship being more evident in case of firms having longer cash conversion cycles and higher current ratios.

Scope of Study

The study studies the Working Capital Management in the Leading Indian Cement Companies. Management of working capital refers to management of current assets, current liabilities and the relationship between them with the basic goal of maintaining a satisfactory level of working capital. A sound working capital policy ensures higher profitability and proper liquidity of a firm.

Period of Study: The Study Covers A Period Of 6 Years From 2011-12 To 2016-17.

Methodology

Sources of Data

The study is based on secondary data. Information required for the study has been collected from the Annual Reports of Ultratech Cement, ACC, Ambuja Cement, Shree Cement, India Cement, Prism Cement, Binani Cement, Ramco Cement, Birla Corp, JK Cement and different books, journal, magazines, and data collected from various websites.

Tools Applied

In this study various tools: Financial Tools – Ratio Analysis and Statistical Tools (i.e.) Mean and ANOVA, t-test has been used for data analysis.

MEAN = Sum of variable/N

Standard Deviation is used to see how measurements for a group are spread out from Mean. A low Standard Deviation means that most of the numbers are very close to the average and vice-versa.

(SD) = $\sqrt{\frac{\sum X^2}{N} - (\frac{\sum X}{N})^2}$

Coefficient of Variation is a standardized measure of dispersion of a probability distribution or frequency distribution. It is the ratio of standard deviation to mean. Higher the coefficient of variation, the greater the level of dispersion around mean and vice-versa. **Coefficient of Variation (COV) = SD/MEAN* 100**

t-Test (Two-Sample Assuming Unequal Variances): t-test assesses whether the means of two groups are statistically different from each other.

Hypothesis

An ANOVA is statistical hypothesis in which the sampling distribution of test statistic when null hypotheses is true. Null hypotheses have been set and adopted for the analysis of data. The null hypotheses are represented by H_0 . It is a negative statement which avoids personal bias of investigator during data collection as well as the time of drawing conclusion.

Limitation of The Study

1. The study is related to a period of 6 years.
2. Data is secondary i.e. they are collected from the published Annual Reports
3. Profitability, Liquidity and Working Capital Turnover ratios have been taken for the study.

Profitability

Profit is the prime motive of every business. It plays a pivotal role behind the success and growth of an enterprise. Profitability is the main base for liquidity as well as solvency. Analysing a company's profitability is an important part of financial statement analysis. Profitability of a company measures the ability to generate earnings.

Operating Profit Margin Ratio: It shows the relationship between Operating Profit and Net Sales.

Exhibit – 1: Operating Profit Margin (%)

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	17.21	15.65	20.59	15.65	14.72	3.42	5.54	22.21	17.45	16.84
2012 - 13	18.15	13.70	20.27	23.48	12.33	3.00	6.44	20.01	15.99	16.44
2013 - 14	15.92	11.90	17.18	16.04	3.33	3.24	0.47	8.66	7.89	9.59
2014 - 15	14.70	10.24	18.52	8.08	9.53	5.10	-1.78	15.14	9.07	11.02
2015 - 16	15.20	7.04	13.48	22.71	10.90	5.84	2.27	23.64	8.67	10.53
2016 - 17	15.64	7.83	10.63	19.70	10.78	5.15	3.91	24.24	11.66	14.30
Mean	16.14	11.06	16.78	17.61	10.27	4.29	2.81	18.99	11.79	13.12
SD	1.30	3.35	3.97	5.69	3.83	1.21	3.12	6.03	4.05	3.16
COV	0.08	0.30	0.24	0.32	0.37	0.28	1.11	0.32	0.34	0.24
CAGR (%)	-1.9	-12.9	-12.4	4.7	-6.1	8.5	-6.7	1.8	-7.7	-3.2

Exhibit-1 depicts that Ramco reported the highest mean value in terms of Operating Profit Margin followed by Shree Cement, Ambuja, Ultratech, JK Cement ACC etc. Standard deviation of Ramco Cement is the highest followed by Shree Cement, Birla Corp, Ambuja, etc. Prism Cement reported the highest CAGR of 8.5%. Ultratech, ACC, Ambuja, India Cement, Binani, Birla Corp & JK Cement reported a negative CAGR.

Hypothesis:

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Operating Profit of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Operating Profit of Cement Companies differ over years)

Exhibit – 2: Operating Profit Margin: Anova
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	96.83	16.14	1.689242
ACC	6	66.36	11.06	11.206481
AMBUJA CEMENT	6	100.68	16.78	15.727214
SHREE CEMENT	6	105.65	17.61	32.381209
INDIA CEMENT	6	61.60	10.27	14.680315
PRISM CEMENT	6	25.76	4.29	1.465667
BINANI CEMENT	6	16.85	2.81	9.728684
RAMCO CEMENT	6	113.91	18.99	36.403111
BIRLA CORP	6	70.73	11.79	16.416368
JK CEMENT	6	78.72	13.12	9.962728

Anova: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1,610.95	9	178.9943	11.95998	0.000000000866	2.073351
Within Groups	748.31	50	14.9661			
Total	2,359.25	59				

Above analysis shows that the F value (11.95998) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that Operating Profit Margin of the Cement Companies differs over the years.

Net Margin Ratio: It shows the relationship between Net profit and sales. ie, Profit left for equity share holders as a percentage of Net sales.

Exhibit – 3: Net Profit Margin (%)

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	12.57	12.60	14.41	10.49	5.61	-0.37	-5.41	11.95	10.47	6.88
2012 - 13	12.71	9.24	13.28	17.96	3.46	-1.27	-4.65	10.54	10.38	7.94
2013 - 14	10.32	9.70	14.03	13.37	-4.77	-1.71	-13.79	3.11	4.30	2.69
2014 - 15	8.74	9.80	14.97	6.61	-0.02	0.09	-14.78	6.73	5.46	4.19
2015 - 16	9.86	4.88	8.61	20.73	2.10	0.47	-11.40	15.22	5.13	1.45
2016 - 17	10.69	5.33	7.06	15.89	2.69	0.30	-12.80	16.74	5.05	5.43
Mean	10.81	8.59	12.06	14.17	1.51	-0.42	-10.47	10.71	6.80	4.76
SD	1.56	2.95	3.35	5.13	3.58	0.89	4.37	5.13	2.84	2.47
COV	0.14	0.34	0.28	0.36	2.37	-2.14	-0.42	0.48	0.42	0.52
CAGR (%)	-3.2	-15.8	-13.3	8.7	-13.7	-195.9	18.8	7.0	-13.6	-4.6

Exhibit-3 depicts that Shree Cements reported the highest mean value in terms of Net Profit Margin followed by Ambuja, Ultratech, Ramco etc. Standard deviation of Ramco Cement is the highest followed by Shree Cement, Binani, Ambuja etc. Binani Cement reported the highest CAGR of 18.8%. Ultratech, ACC, Ambuja, India Cement, Prism Cement, Birla Corp & JK Cement reported a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Net Profit of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Net Profit of Cement Companies differ over years)

Exhibit – 4: Net Profit Margin: ANOVA
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	64.88	10.81	2.425863
ACC	6	51.56	8.59	8.716298
AMBUJA CEMENT	6	72.36	12.06	11.254178
SHREE CEMENT	6	85.04	14.17	26.357876
INDIA CEMENT	6	9.07	1.51	12.827023
PRISM CEMENT	6	-2.50	-0.42	0.791994
BINANI CEMENT	6	-62.83	-10.47	19.072502
RAMCO CEMENT	6	64.29	10.71	26.366906
BIRLA CORP	6	40.80	6.80	8.037906
JK CEMENT	6	28.58	4.76	6.117504

ANOVA: VARIATION

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2,941.38	9	326.8204	26.79557	0.000000000000	2.073351
Within Groups	609.84	50	12.1968			
Total	3,551.22	59				

Above analysis shows that the F value (26.79557) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that Net Profit Margin of the Cement Companies differs over the years

Liquidity & Working Capital Management

Working Capital Management plays a significant role to enhance the profitability of an entity. Moreover, Profit has a direct relation with Liquidity. Working Capital (WC) is a financial metric which represents operating liquidity available to a business, or an entity. Working Capital is calculated as current assets minus current liabilities. If Current Assets are less than Current Liabilities, an entity has a Working Capital Deficiency.

Exhibit – 5: Working Capital

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	18,825	11,203	14,872	3,575	-10,948	-1,261	-9,702	-4,692	9,730	3,354
2012 - 13	12,157	13,737	23,613	7,107	-9,376	-2,491	-13,449	-3,606	-52,894	1,718
2013 - 14	29,659	7,506	26,740	8,548	-9,511	-1,052	-18,929	-4,857	14,023	1,751
2014 - 15	-19,439	-1,259	28,581	6,188	-9,145	-550	-11,479	-5,145	18,150	18,150
2015 - 16	-10,844	-3,823	32,915	6,470	-10,803	-445	-13,904	-6,991	17,390	17,390
2016 - 17	49,954	185	6,010	12,932	-4,806	-5,003	-14,249	-6,037	7,812	7,812
Mean	13,385	4,592	22,122	7,470	-9,098	-1,800	-13,619	-5,221	2,368	8,362
SD	25,682	7,215	9,939	3,128	2,236	1,731	3,118	1,168	27,380	7,623
COV	1.92	1.57	0.45	0.42	-0.25	-0.96	-0.23	-0.22	11.56	0.91
CAGR (%)	21.6	-56.0	-16.6	29.3	-15.2	31.7	8.0	5.2	-4.3	18.4

Exhibit-5 depicts that Ambuja Cement has the highest mean in terms of Working Capital followed by Ultratech, JK Cement, Shree Cement, ACC etc. India, Prism, Binani and Ramco Cement reported Negative Mean value. Standard deviation of Birla Corp is highest followed by Ultratech, Ambuja, JK Cement, ACC etc. Ultratech reported the highest CAGR of 21.6% followed by JK Cement, while Ambuja, ACC, India Cement had a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Working Capital of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Working Capital of Cement Companies differ over years)

Exhibit – 6: Working Capital: ANOVA

ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	80,312	13,385	65,95,40,536
ACC	6	27,550	4,592	5,20,60,676
AMBUJA CEMENT	6	1,32,731	22,122	9,87,79,432
SHREE CEMENT	6	44,819	7,470	97,87,394
INDIA CEMENT	6	-54,590	-9,098	50,01,156
PRISM CEMENT	6	-10,802	-1,800	29,96,610
BINANI CEMENT	6	-81,712	-13,619	97,24,732
RAMCO CEMENT	6	-31,327	-5,221	13,65,032
BIRLA CORP	6	14,211	2,368	74,96,68,293
JK CEMENT	6	50,175	8,362	5,81,10,892

ANOVA: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	6,22,88,48,532	9	69,20,94,281.4	4.20206	0.000437372523	2.073351
Within Groups	8,23,51,73,769	50	16,47,03,475.4			
Total	14,46,40,22,302	59				

Above analysis shows that the F value (4.20206) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that Working Capital of the Cement Companies differs over the years.

Liquidity Ratios

It refers to the ability of a firm to honour its short term obligations. Here short term generally means one year or within the working capital cycle. The important Liquidity ratios are as follows.

Current Ratio: It measures the excess of Current assets over the Current Liabilities of an entity. Higher the Current Ratio indicates that firm can easily meet up its short term obligations with its available Current Assets. It should be noted that a

firm with high proportion of Current Assets in the form of Cash and Debtors is more liquid than a firm with its maximum Current Assets in the form of Inventories, even though both have the same Current Ratio. Current Ratio also depends on the operating cycle of a firm. Longer the operating cycle, higher the Current ratio and vice versa. Normally a Current Ratio of 2:1 is acceptable.

Exhibit – 7: Current Ratio

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	1.35	1.33	1.53	1.32	0.54	0.91	0.59	0.69	2.46	1.45
2012 - 13	1.17	1.40	1.81	1.35	0.63	0.87	0.48	0.78	0.22	1.19
2013 - 14	1.45	1.20	1.94	1.60	0.64	0.94	0.40	0.72	2.58	1.15
2014 - 15	0.82	0.97	1.91	1.44	0.64	0.97	0.55	0.71	4.09	4.09
2015 - 16	0.91	0.90	2.02	1.56	0.59	0.98	0.53	0.66	2.86	2.86
2016 - 17	1.60	1.00	1.08	1.65	0.80	0.76	0.53	0.70	1.59	1.59
Mean	1.22	1.13	1.71	1.49	0.64	0.91	0.51	0.71	2.30	2.06
SD	0.31	0.21	0.35	0.14	0.09	0.08	0.07	0.04	1.30	1.18
COV	0.25	0.18	0.21	0.09	0.14	0.09	0.13	0.06	0.56	0.57
CAGR (%)	3.4	-5.4	-6.8	4.5	8.1	-3.6	-2.0	0.4	-8.3	1.9

Exhibit-7 depicts that Birla Corp has the highest mean in terms of Current Ratio followed by JK Cement, Ambuja, Shree, Ultratech, ACC etc. Standard deviation of Birla Corp is highest followed by JK Cement, Ambuja, Ultratech etc. India Cement reported the highest CAGR of 8.1%, while ACC, Ambuja, Prism, Binani and Birla Corp had a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Current Ratio of the Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Current Ratio of the Cement Companies differ over years)

Exhibit – 8: Current Ratio: ANOVA
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	7.307	1.218	0.096
ACC	6	6.800	1.133	0.042
AMBUJA CEMENT	6	10.283	1.714	0.125
SHREE CEMENT	6	8.917	1.486	0.019
INDIA CEMENT	6	3.842	0.640	0.008
PRISM CEMENT	6	5.431	0.905	0.007
BINANI CEMENT	6	3.081	0.514	0.004
RAMCO CEMENT	6	4.250	0.708	0.002
BIRLA CORP	6	13.804	2.301	1.685
JK CEMENT	6	12.333	2.055	1.384

ANOVA: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	20.1693944	9	2.24104382	6.64763923	3.46772E-06	2.073351
Within Groups	16.8559374	50	0.33711875			
Total	37.0253319	59				

Above analysis shows that the F value (6.64763923) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that the Current Ratio of the Cement Companies differ over the years.

Liquid Ratio: It refers to the ability of a firm to meet its short term obligations.

Liquid / Quick / Acid Test Ratio = (Current Assets – Stock) / Current Liabilities

Exhibit – 9: Liquid Ratio

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	0.94	1.00	1.20	0.96	0.31	0.56	0.33	0.36	1.83	0.96
2012 - 13	0.81	1.07	1.47	1.10	0.41	0.55	0.23	0.41	0.14	0.68
2013 - 14	1.06	0.90	1.61	1.23	0.41	0.63	0.20	0.31	2.00	0.69
2014 - 15	0.56	0.64	1.63	0.79	0.39	0.59	0.39	0.42	3.15	3.17
2015 - 16	0.70	0.58	1.74	0.86	0.36	0.65	0.40	0.39	2.25	2.33
2016 - 17	1.31	0.70	0.79	0.99	0.48	0.49	0.42	0.42	1.11	1.17
Mean	0.90	0.82	1.41	0.99	0.39	0.58	0.33	0.38	1.75	1.50
SD	0.27	0.20	0.35	0.16	0.06	0.06	0.09	0.04	1.03	1.02
COV	0.30	0.25	0.25	0.16	0.15	0.10	0.28	0.11	0.59	0.68
CAGR (%)	6.9	-6.9	-8.0	0.6	9.5	-2.8	4.7	2.9	-9.5	3.9

Exhibit-9 depicts that Birla Corp has the highest mean in terms of Liquid Ratio followed by JK Cement, Ambuja, Shree, Ultratech, ACC etc. Standard deviation of Birla Corp is highest followed by JK Cement, Ambuja, Ultratech etc. India Cement reported the highest CAGR of 9.5%, while ACC, Ambuja, Prism and Birla Corp had a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Liquid Ratio of the Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Liquid Ratio of the Cement Companies differ over years)

Exhibit – 10: Liquid Ratio: ANOVA
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	5.376	0.896	0.073
ACC	6	4.894	0.816	0.041
AMBUJA CEMENT	6	8.438	1.406	0.125
SHREE CEMENT	6	5.922	0.987	0.026
INDIA CEMENT	6	2.346	0.391	0.003
PRISM CEMENT	6	3.480	0.580	0.003
BINANI CEMENT	6	1.969	0.328	0.008
RAMCO CEMENT	6	2.306	0.384	0.002
BIRLA CORP	6	10.488	1.748	1.055
JK CEMENT	6	8.998	1.500	1.039

ANOVA: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	13.82281829	9	1.535868699	6.46454045	4.85454E-06	2.073351
Within Groups	11.87917926	50	0.237583585			
Total	25.70199755	59				

Above analysis shows that the F value (6.46454045) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that the Liquid Ratio of the Cement Companies differ over the years.

Turnover Ratios

Turnover ratios are also known as Activity Ratios or Asset Management Ratios. It helps to measure, how well the Assets are employed by a firm.

Working Capital Turnover: It reflects the efficiency of WCM management by a firm during a financial period. Higher the Working Capital Turnover ratio indicates that the inventories have been managed more efficiently and vice versa.

Working Capital Turnover = Net Sales / (Current Assets – Current Liabilities)

Exhibit – 11: Working Capital Turnover

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	10.13	9.14	5.7	16.5	-4.23	-36.07	-3.16	-6.87	2.35	7.57
2012 - 13	17.40	8.27	4.1	7.9	-5.50	-19.16	-3.33	-10.62	-0.49	16.91
2013 - 14	7.23	14.85	3.4	6.9	-5.35	-47.16	-2.50	-7.58	2.15	15.89
2014 - 15	-12.37	-93.22	3.5	10.4	-5.53	-101.58	-3.77	-7.10	1.77	1.87
2015 - 16	-23.20	-30.86	2.9	8.5	-5.12	-117.29	-2.72	-5.12	1.88	2.18
2016 - 17	5.08	604.96	33.4	6.5	-12.20	-10.02	-2.57	-6.57	5.57	5.20
Mean	0.71	85.52	8.84	9.45	-6.32	-55.21	-3.01	-7.31	2.20	8.27
SD	15.31	257.72	12.09	3.72	2.92	44.22	0.50	1.82	1.94	6.64
COV	21.48	3.01	1.37	0.39	-0.46	-0.80	-0.17	-0.25	0.88	0.80
CAGR (%)	-12.9	131.3	42.3	-16.9	23.6	-22.6	-4.1	-0.9	18.8	-7.2

Exhibit-11 depicts that ACC has the highest mean in terms of Working Capital Turnover followed Shree, JK Cement, Ambuja and Birla Corp. India, Prism, Binani and Ramco Cement reported Negative Mean value. ACC reported the highest CAGR of 131.3% followed by Ambuja, while Ultratech, Shree, Prism, Binani, Ramco & JK Cement had a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (WC Turnover of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (WC Turnover of Cement Companies differ over the years)

Exhibit – 12: Working Capital Turnover: ANOVA
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	4.28	0.71	234.355
ACC	6	513.13	85.52	66,421.468
AMBUJA CEMENT	6	53.02	8.84	146.178
SHREE CEMENT	6	56.72	9.45	13.831
INDIA CEMENT	6	-37.93	-6.32	8.512
PRISM CEMENT	6	-331.29	-55.21	1,955.605
BINANI CEMENT	6	-18.06	-3.01	0.248
RAMCO CEMENT	6	-43.88	-7.31	3.324
BIRLA CORP	6	13.22	2.20	3.778
JK CEMENT	6	49.60	8.27	44.138

ANOVA: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	63,121.78	9	7,013.5307	1.01894	0.438104143	2.073351
Within Groups	3,44,157.18	50	6,883.1437			
Total	4,07,278.96	59				

Above analysis shows that the F value (1.01894) is less than the table value (2.073351) therefore null hypothesis is accepted. Therefore it is concluded that Working Capital Turnover of the Cement Companies doesn't differ over the years.

Inventory Turnover Ratio: It reflects the efficiency of Inventory management by a firm during a financial period. Higher the Inventory Turnover ratio indicates that the inventories have been managed more efficiently and vice versa. Inventory includes Raw Materials, Work-in-Progress and Finished Goods

Inventory Turnover Ratio = Cost of Goods Sold (COGS) / Average Inventory

Exhibit – 13: Inventory Turnover Ratio

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	1.36	1.54	0.70	1.55	1.24	3.90	1.87	0.99	1.04	0.89
2012 - 13	1.38	1.54	0.50	0.86	1.27	3.40	1.85	0.98	0.81	0.93
2013 - 14	1.48	1.57	0.85	0.87	1.35	3.40	2.35	1.08	0.98	0.85
2014 - 15	1.50	1.66	0.94	0.69	1.38	3.53	2.42	1.13	0.88	1.06
2015 - 16	1.67	1.51	0.93	0.52	1.34	2.94	2.58	1.10	1.08	1.35
2016 - 17	1.85	1.40	1.58	0.59	1.32	3.08	2.67	1.22	1.13	1.44
Mean	1.54	1.54	0.92	0.85	1.32	3.37	2.29	1.08	0.99	1.09
SD	0.19	0.08	0.36	0.37	0.05	0.34	0.35	0.09	0.12	0.25
COV	0.12	0.05	0.40	0.44	0.04	0.10	0.15	0.08	0.12	0.23
CAGR (%)	6.4	-1.9	17.8	-17.6	1.2	-4.6	7.4	4.3	1.7	10.0

Exhibit-13 depicts that Prism Cement has the highest mean in terms of Inventory Turnover followed Binani, Ultratech and ACC. Ambuja Cement reported the highest CAGR of 17.8% followed by JK Cement. ACC, Shree and Prism reported a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Inventory Turnover of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Inventory Turnover of Cement Companies differ over years)

Exhibit – 14: Inventory Turnover: ANOVA
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	9.232	1.539	0.036
ACC	6	9.228	1.538	0.007
AMBUJA CEMENT	6	5.495	0.916	0.133
SHREE CEMENT	6	5.083	0.847	0.140
INDIA CEMENT	6	7.896	1.316	0.003
PRISM CEMENT	6	20.237	3.373	0.116
BINANI CEMENT	6	13.726	2.288	0.124
RAMCO CEMENT	6	6.487	1.081	0.008
BIRLA CORP	6	5.923	0.987	0.015
JK CEMENT	6	6.520	1.087	0.063

ANOVA: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	33.24811492	9	3.694234991	57.34242624	2.98238E-23	2.073351
Within Groups	3.221205687	50	0.064424114			
Total	36.46932061	59				

Above analysis shows that the F value (57.34242624) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that Inventory Turnover of the Cement Companies differs over the years.

Debtors Turnover Ratio: Debtors Turnover ratio measures the liquidity of a firm in relation to its Debtors. It reflects the efficiency of management of Receivables by a firm during a financial period.

Debtors Turnover Ratio = Net Sales/ Average Debtors

Exhibit – 15: Debtors Turnover

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	19.94	39.75	45.33	57.07	18.14	15.20	35.39	16.83	56.25	35.13
2012 - 13	17.16	39.96	41.60	38.65	13.97	11.86	35.35	15.00	46.40	29.19
2013 - 14	14.26	31.86	39.98	23.75	10.67	9.85	28.14	12.14	40.31	24.51
2014 - 15	14.61	29.06	42.55	16.32	10.44	10.20	14.55	10.65	39.72	23.46
2015 - 16	14.02	26.36	35.96	13.70	10.37	8.90	7.42	8.38	36.08	19.49
2016 - 17	13.77	23.49	38.13	25.40	10.82	8.10	5.04	7.73	38.35	19.66
Mean	15.63	31.75	40.59	29.15	12.40	10.69	20.98	11.79	42.85	25.24
SD	2.45	6.87	3.32	16.22	3.13	2.55	13.75	3.61	7.41	6.02
COV	0.16	0.22	0.08	0.56	0.25	0.24	0.66	0.31	0.17	0.24
CAGR (%)	-7.1	-10.0	-3.4	-14.9	-9.8	-11.8	-32.3	-14.4	-7.4	-11.0

Exhibit-15 depicts that Binani Cement has the highest mean in terms of Debtors Turnover followed by Ambuja, Shree, Binani etc. Shree Cement reported the highest SD of 16.22. All the Cement Companies reported a negative CAGR.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Debtors Turnover of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Debtors Turnover of Cement Companies differ over years)

Exhibit – 16: Debtors Turnover: ANOVA

ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	93.759	15.626	5.981
ACC	6	190.488	31.748	47.178
AMBUJA CEMENT	6	243.552	40.592	11.035
SHREE CEMENT	6	174.880	29.147	263.244
INDIA CEMENT	6	74.408	12.401	9.771
PRISM CEMENT	6	64.112	10.685	6.523
BINANI CEMENT	6	125.889	20.982	188.971
RAMCO CEMENT	6	70.736	11.789	13.049
BIRLA CORP	6	257.093	42.849	54.892
JK CEMENT	6	151.436	25.239	36.259

ANOVA: Variation

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	7551.950273	9	839.105586	13.1747737	1.78579E-10	2.073351
Within Groups	3184.516126	50	63.690323			
Total	10736.4664	59				

Above analysis shows that the F value (13.1747737) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that Debtors Turnover of the Cement Companies differs over the years.

Creditors Turnover Ratio: It measures the time taken by a firm to pay off its Creditors or Suppliers. This ratio depends on Inventory and Debtors Turnover Ratio.

Creditors Turnover Ratio = Cost of Goods Sold / Average Creditors

Exhibit – 17: Creditors Turnover

Year	Ultratech	ACC	Ambuja	Shree	India	Prism	Binani	Ramco	Birla Corp	JK Cement
2011 - 12	1.45	1.23	0.62	2.68	0.99	3.73	1.40	3.38	3.75	1.73
2012 - 13	1.44	2.34	0.50	2.94	0.86	2.84	1.23	4.47	3.32	2.06
2013 - 14	1.53	2.73	1.08	3.37	0.84	2.68	1.47	4.32	3.79	1.33
2014 - 15	1.89	2.83	1.45	2.04	0.88	3.10	1.44	3.32	2.99	1.53
2015 - 16	2.59	2.27	1.28	1.62	0.85	2.76	1.19	2.63	3.74	2.28
2016 - 17	2.52	1.59	1.71	2.11	0.78	2.62	1.01	2.92	2.57	2.82
Mean	1.90	2.17	1.11	2.46	0.87	2.96	1.29	3.51	3.36	1.96
SD	0.53	0.63	0.47	0.65	0.07	0.42	0.18	0.75	0.50	0.54
COV	0.28	0.29	0.43	0.26	0.08	0.14	0.14	0.21	0.15	0.28
CAGR (%)	11.7	5.3	22.7	-4.7	-4.5	-6.8	-6.4	-2.9	-7.3	10.2

Exhibit-17 depicts that Ramco Cement has the highest mean in terms of Creditors Turnover followed by Birla Corp, Prism, Shree Cement, Ultratech etc. Ambuja Cement reported the highest CAGR of 22.7% followed by Ultratech and JK Cement.

Hypothesis

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7 = \mu_8 = \mu_9 = \mu_{10}$ (Creditors Turnover of Cement Companies doesn't differ over years)

$H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq \mu_6 \neq \mu_7 \neq \mu_8 \neq \mu_9 \neq \mu_{10}$ (Creditors Turnover of Cement Companies differ over years)

Exhibit – 18: Creditors Turnover: ANOVA
ANOVA: Single Factor

Groups	Count	Sum	Average	Variance
ULTRATECH CEMENT	6	11.415	1.902	0.280
ACC	6	13.000	2.167	0.400
AMBUJA CEMENT	6	6.637	1.106	0.224
SHREE CEMENT	6	14.764	2.461	0.423
INDIA CEMENT	6	5.202	0.867	0.004
PRISM CEMENT	6	17.732	2.955	0.174
BINANI CEMENT	6	7.736	1.289	0.032
RAMCO CEMENT	6	21.036	3.506	0.555
BIRLA CORP	6	20.165	3.361	0.248
JK CEMENT	6	11.760	1.960	0.296

ANOVA: VARIATION

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	45.74099507	9	5.082332786	19.27210549	2.15735E-13	2.073351
Within Groups	13.18572273	50	0.263714455			
Total	58.9267178	59				

Above analysis shows that the F value (19.27210549) is more than the table value (2.073351) therefore null hypothesis is rejected. Therefore it is concluded that Creditors Turnover of the Cement Companies differs over the years.

T-Test: It is used to test the null hypothesis that the variances of two populations are not equal. If t Stat value lies between - t Critical two tail and + t Critical two test we don't reject Null Hypothesis.

Cash is the life blood of every business. Cash Conversion Cycle states the time taken by an entity to receive its payments after it has paid for its materials or inventory.

Positive Cash Cycles occur when inventory and Debtors conversion period are more than time taken to pay off the suppliers. Negative Cash Cycle is complete opposite of the above situation.

Unlike Negative Cash Flow, a Negative Cash Cycle is a positive indication as the company do not pay for inventory or materials till the money is realised from sales.

Exhibit –19: T-Test: Two-Sample Assuming Unequal Variances (Ultratech Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	240.0377748	23.78331483	203.7887377	60.03235191
Variance	764.844104	10.71920643	2688.502985	889.1052285
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	10	5	8	
t Stat	10.84176809	-2.960010206	5.887167348	
P(T<=t) one-tail	3.77109E-07	0.01575926	0.00018351	
t Critical one-tail	1.812461102	2.015048372	1.859548033	
P(T<=t) two-tail	7.54217E-07	0.03151852	0.000367019	
t Critical two-tail	2.228138842	2.570581835	2.306004133	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.228138842 & + 2.228138842. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.306004133 & + 2.306004133. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –20: T-Test: Two-Sample Assuming Unequal Variances (ACC)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	237.8986893	11.95242445	184.0755454	65.77556831
Variance	170.1924145	6.533952024	4309.417774	3,740.050138
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	5	5	10	
t Stat	6.74237632	-2.153906985	3.229807949	
P(T<=t) one-tail	0.000544423	0.04191498	0.004511944	
t Critical one-tail	2.015048372	2.015048372	1.812461102	
P(T<=t) two-tail	0.001088847	0.083829961	0.009023888	
t Critical two-tail	2.570581835	2.570581835	2.228138842	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 = \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)
Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)
 $H_1: \mu_1^2 = \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)
Here the t Stat value don't lie between - 2.228138842 & + 2.228138842. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –21: T-Test: Two-Sample Assuming Unequal Variances (Ambuja)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	448.9579826	9.042660907	401.2192181	56.78142544
Variance	27529.41865	0.556589332	43371.53029	6,054.872478
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	7	5	6	
t Stat	5.241905193	-1.502707106	3.794957536	
P(T<=t) one-tail	0.00059838	0.096615323	0.004510434	
t Critical one-tail	1.894578604	2.015048372	1.943180274	
P(T<=t) two-tail	0.001196759	0.193230647	0.009020869	
t Critical two-tail	2.364624251	2.570581835	2.446911846	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)
 $H_1: \mu_1^2 = \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)
Here the t Stat value don't lie between - 2.364624251 & + 2.364624251. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)
 $H_1: \mu_1^2 = \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)
Here the t Stat value lies between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)
 $H_1: \mu_1^2 = \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)
Here the t Stat value don't lie between - 2.446911846 & + 2.446911846. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –22: T-Test: Two-Sample Assuming Unequal Variances (Shree Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	487.9932395	15.76565416	157.613213	346.1456807
Variance	27245.47997	58.36933999	1853.504974	19,504.243440
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	10	5	6	
t Stat	1.606970737	-5.785967363	-3.159977891	
P(T<=t) one-tail	0.069570355	0.001085328	0.009782787	
t Critical one-tail	1.812461102	2.015048372	1.943180274	
P(T<=t) two-tail	0.139140709	0.002170656	0.019565575	
t Critical two-tail	2.228138842	2.570581835	2.446911846	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value lies between - 2.228138842 & + 2.228138842. Therefore, we reject Null Hypothesis stating that the variances are equal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.446911846 & + 2.446911846. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –23: T-Test: Two-Sample Assuming Unequal Variances (India Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	277.7481415	30.72565507	423.0016767	-114.5278801
Variance	128.4237519	38.53276917	980.0314158	1,085.093553
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	6	5	10	
t Stat	27.58318425	10.61430063	28.9737565	
P(T<=t) one-tail	7.50674E-08	6.41768E-05	2.79544E-11	
t Critical one-tail	1.943180274	2.015048372	1.812461102	
P(T<=t) two-tail	1.50135E-07	0.000128354	5.59087E-11	
t Critical two-tail	2.446911846	2.570581835	2.228138842	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.446911846 & + 2.446911846. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.228138842 & + 2.228138842. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –24: T-Test: Two-Sample Assuming Unequal Variances (Prism Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	109.1345592	35.61763671	125.3123298	19.43986613
Variance	119.9628337	55.7538659	238.6349393	85.793679
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	

df	10	10	8	
t Stat	15.31671311	3.330758362	14.39789712	
P(T<=t) one-tail	1.4299E-08	0.003804065	2.64591E-07	
t Critical one-tail	1.812461102	1.812461102	1.859548033	
P(T<=t) two-tail	2.8598E-08	0.00760813	5.29183E-07	
t Critical two-tail	2.228138842	2.228138842	2.306004133	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.228138842 & + 2.228138842. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.228138842 & + 2.228138842 Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.306004133 & + 2.306004133. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –25: T-Test: Two-Sample Assuming Unequal Variances (Binani Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	162.9836499	30.04670454	288.1419833	-95.1116289
Variance	718.826727	650.4824169	1913.271272	1,217.244090
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	9	9	10	
t Stat	14.36795854	7.093796989	16.77853207	
P(T<=t) one-tail	8.19308E-08	2.85273E-05	5.92976E-09	
t Critical one-tail	1.833112923	1.833112923	1.812461102	
P(T<=t) two-tail	1.63862E-07	5.70546E-05	1.18595E-08	
t Critical two-tail	2.262157158	2.262157158	2.228138842	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.262157158 & + 2.262157158. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.262157158 & + 2.262157158. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.228138842 & + 2.228138842. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –26: T-Test: Two-Sample Assuming Unequal Variances (Ramco Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	339.5370439	33.52014368	108.0345185	265.0226691
Variance	792.6256839	105.1119706	502.791843	1,266.157346
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	9	6	8	
t Stat	4.022632865	-15.3133419	-9.142917883	
P(T<=t) one-tail	0.00150306	2.4493E-06	8.25101E-06	
t Critical one-tail	1.833112923	1.943180274	1.859548033	
P(T<=t) two-tail	0.00300612	4.89861E-06	1.6502E-05	
t Critical two-tail	2.262157158	2.446911846	2.306004133	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.262157158 & + 2.262157158. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.446911846 & + 2.446911846. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.306004133 & + 2.306004133. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –27: T-Test: Two-Sample Assuming Unequal Variances (Birla Corp)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	374.8618255	8.706116769	110.8489965	265.0226691
Variance	2436.651716	1.724683782	333.8639692	1,266.157346
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	9	5	7	
t Stat	4.421474809	-17.63245787	-9.441107852	
P(T<=t) one-tail	0.000833809	5.38094E-06	1.56084E-05	
t Critical one-tail	1.833112923	2.015048372	1.894578604	
P(T<=t) two-tail	0.001667619	1.07619E-05	3.12167E-05	
t Critical two-tail	2.262157158	2.570581835	2.364624251	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.262157158 & + 2.262157158. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.364624251 & + 2.364624251. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Exhibit –28: T-Test: Two-Sample Assuming Unequal Variances (Jk Cement)

	Inventory-Days	Debtor-Days	Creditors-Days	Cash Cycle-Days
Mean	349.9789889	15.10658087	198.1747893	166.9107804
Variance	5465.947203	10.86756492	2808.617246	1,844.120771
Observations	6	6	6	6
Hypothesized Mean Difference	0	0	0	
df	8	5	10	
t Stat	5.244786922	-8.633538298	1.122705864	
P(T<=t) one-tail	0.000389374	0.000172126	0.14389714	
t Critical one-tail	1.859548033	2.015048372	1.812461102	
P(T<=t) two-tail	0.000778749	0.000344251	0.28779428	
t Critical two-tail	2.306004133	2.570581835	2.228138842	

Inventory-Days & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Inventory (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Inventory (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.306004133 & + 2.306004133. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Debtors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Debtor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Debtor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value don't lie between - 2.570581835 & + 2.570581835. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Creditors Velocity & Cash Conversion Cycle-Days

$H_0: \mu_1^2 = \mu_2^2$ (There is significant relationship between Creditor (Days) & Cash Cycle, Variance is not Equal)

$H_1: \mu_1^2 \neq \mu_2^2$ (There is significant no relationship between Creditor (Days) & Cash Cycle, Variance is Equal)

Here the t Stat value lies between - 2.228138842 & + 2.228138842. Therefore, we accept Null Hypothesis stating that the variances are unequal.

Conclusion

Working Capital Management is an important aspect of financial decision making. Companies need to allocate an appropriate proportion of the total capital for working capital. It can help them to enhance their profitability and reduce the risk of solvency.

The study reveals that:

1. In terms of Margin Ratios: Ramco Cement is in the top position (Operating Profit) while Shree Cement is in the top position (Net Profit) .
2. In terms of Working Capital: Ambuja Cement is in the top position.
3. In terms of Liquidity: Current Ratio, Liquid/ Acid Test Ratio, Birla Corp is in the top position.
4. ACC, Prism, Binani, Ramco Cement are in the top position, in terms of Working Capital Turnover, Inventory Turnover, Debtors Turnover & Creditors Turnover Ratio.
5. Composite Performance shows that Ramco Shree Cement, Ambuja, Ultratech are in better position in comparison to other Cement Companies.

T-Test Conducted Revealed That

1. There is significant relationship between Inventory-Days & Cash Conversion Cycle-Days



2. There is significant relationship between Debtors Velocity & Cash Conversion Cycle-Days
3. There is significant relationship between Creditors Velocity & Cash Conversion Cycle-Days

The analyses presented above can help the companies identify the areas where there is a scope of improvement for better performance.

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