International Journal of Research Publication and Reviews

A Study on Working Capital Management & Profitability of Cement Industries in India

Nikita Suryavanshi[1], Soni Biradar[2]

1Aradhana Degree College Kalaburgi, Karnataka, India-585105
2Karnataka Arts, Science, &Commerce College Bidar, Karnataka, India-585402
1nikitasuryavanshi2899@gmail.com, 2sonibiradar1245@gmail.com

ABSTRACT:

 The Study of Working capital management analyses the efficiency & its components i.e. inventory amount, cash and bank balances and various current liabilities. Working capital management is a fundamental part of the overall corporate strategy in creating shareholder's value. Decisions relating to working capital involve managing the relationship between a firm's short-term Asset &liabilities. Today the management of working capital is one of the important & challenging aspects of overall financial management. Working capital management is the management of short-term financing requirements of a firm which includes maintaining optimum balance of working capital components - receivables, inventory and payable and using cash for day-to-day operation in every industry. This study examines and evaluates the working capital management in cement industries. This also finds a relationship between working capital efficiency and profitability. The level of working capital must properly determine and allocated to various segments, effectively controlled regularly viewed in order to have adequate and efficient flow of working capital. Such analysis helps us to study upward/downward trends in current assets and current liabilities and its effect on working capital. An important part of managing working capital is maintaining liquidity in day-to-day operations to ensure smooth running of data base software. Information about the firm and meeting its obligations, as well as to ensure that the business is earning sufficient profits for its survival and the companies including nature of the company, size, age, state and region, company background, value of total asset and growth. Five Bombay Stock Exchange (BSE) listed cement companies located in different regions of India have been selected as a sample for the study. An attempt has been made to investigate the existence of the relationship between working capital management and profitability, Average receivable period, Inventory conversion period, Average payment period, Cash conversion cycle, which expresses the efficiency of working capital. It is found that there exists a negative relationship between Profitability and Number of days of account payables and Number of days of inventory, But a positive relationship between profitability and Number of days of account Receivable.

Keywords: Working capital, profitability, liquidity, current asset, current liabilities, descriptive analysis, correlation, regression.

1. Introduction:

 A study of working capital management on cement industries' main aim is to analyse the working capital issues like liquidity and profitability of the working capital management and analyse the various sources of working capital finance. Cement industry plays an important role for growth in any country. In India, since independence, great emphasis has been laid on the development of the cement industry. It is one of the key basic industries in India. Working capital management involves the process of converting investment into inventories and accounts receivables into cash for the firm use in paying its operational bill. It also involves a risk-return trade-off by not taking additional risk unless and until it is well compensated withadditional assured returns. Working capital management, profitability, and liquidity. is work as blood in business. So, any business firm cannot work without working capital. An important part of managing working capital is maintaining liquidity in day-to-day operations to ensure smooth running of the firm and meeting its obligations, as well as to ensure that the business is earning sufficient profit for its survival and growth. There are chances of mismatch in current assets and current liabilities during this process, which could affect the growth and profitability of the business. A popular measure of working capital management is the cash conversion cycle, that is the time lag between the expenditure for purchase of raw material and the collection from sales of finished goods. The longer this time lag, the larger the investment in working capital. A longer cash conversion cycle however might increase profitability because it leads to higher sales. On the other hand, corporate profitability might also decrease with a longer cash conversion cycle if the cost of higher investment in working capital rise faster than the benefits of holding inventory or granting more trade credit to customer. Many research studies like Shin and Soenen (1998) have highlighted the importance of shortenings cash conversion cycle (CCC), as manager can Create value for their shareholders by reducing the cycle to a reasonable minimum. Working capital management concerned with short term financial decisions. The main objective of the study is to provide empirical evidence about the effect of working capital management, profitability, liquidity of 5 sample companies. The relationship between the working capital management and profitability of selected Indian companies such as 1. Anjani cement Ltd, 2. JK Lakshmi cement Ltd, 3. India cement Ltd, 4. Shree cement, 5. Deccan cements Ltd. On these 5 cement industries to analyses 5 years working

2. Review of literature:

Awalakki Manjunath (2020) has studied the efficiency of working capital management an efficiency index is constructed and compared with firm's profitability, and Return on Current Assets is used as proxy for measuring the firms' Profitability. The paper used statistical tools like correlation, and regression model, with diagnostic tests for justification of accuracy of the model. The study highlights that selected firms doesn't have significant relationship with earnings of the firms. There is sufficient evidence in existing financial literature that presents the significance of working capital management. Results of empirical analysis show that there is statistical evidence of a strong relationship between a firm's profitability and working capital management efficiency. A firm thatfaces lesser competition normally focuses on minimizing receivables to increase future possibilities of cash flow.Rehman (2006) has studied the impact of different variables of working capital management including Average collection period, inventory turnover in days, Average payment period, and cash conversion cycle on net operating profitability of firm's and concluding by indicating that there was a strong negative relationship between these working capital financial ratios and profitability of firms. Dr. Muhammad Azam (2011) has done the study to investigate the impact of working capital Management on firms' performance. The results are obtained by using Canonical Correlation Analysis for identifying the relationship between working capital management and firms' performance. The findings of his study show that working capital management has significant impact on firms' performance and it is concluded that managers can increase value of shareholders and returns on assets by reducing their inventory size, cash conversion cycle and net trading cycle.Chowdhury and Amin (2007) have done the study to measure the impact of overall working capital policies on the profitability firms. The primary and secondary data was used for the purpose of study. The results of their study indicated that for the overall performance of the industry, working capital management played a vital role and there existed a positive relationship between current assets management and performance of firms.Sumaira Tufail (2012) has mentioned in her study that Working capital can be considered as source of existence for a financial body and management of working capital is regarded as one of the most essential part of business management. Results of her study shows that aggressiveness of workingcapital managementpolicies is negatively associated with profitability. Moreover, liquidity and size of the firm have positive relation profitability whereas debt to equity ratio is negatively correlation with profitability. Singh and Pandey (2008) have made an attempt to study the working capital components and the impact of WCM on profitability Hindalco industries limited for period from 1990 to 2007. Results of the study have shown that current ratio, liquid ratio, receivable turnover ratio and working capital to total assets ratio have a statistically significant impact on the profitability of Hindalco Industries limited. Singh has found that the size of inventory directly effects on working capital management. He has suggested that inventory is the major component of working capital and needs careful attention. Singh and Pandey (2008) have suggested that for the successful working of any business organisation, fixed and currentassets play vital roles, and the management of working capital is essential as it has a direct impact of profitability and liquidity. Afza and Nazir (2009) have made an attempt to investigate the traditional relationship between working capital management policies and a firm's profitability for a sample of 204 non-financial firms listed on Karachi Stock Exchange(KSE) for the period 1998-2005. The study reveals some significant differences among various working capital needs and financial policies across different industries. Moreover, regression result has also found a negative relationship between the profitability of firms and degree of aggressiveness of working capital investment and working capital financial policies. Ramachandran and Janakiraman (2009) have found a negative relationship between earnings before interest and tax (EBIT) and the CCC. The study reveals that operational EBIT dictates how to manage the working capital of a firm. Further, it is found that lower gross EBIT is associated with an increase in the account payable days. Thus,the study concludes by saying that less profitable firms wait longer to pay their bills, taking advantage of credit period granted by supplier. The positive relationship between average receivable days and a firm's EBIT suggests that less profitable firms pursue a decrease of their account receivable days to reduce their cash back in the CCC. Nazir and Afza (2009) have used internal and external factors to explore the determinants of working capital requirement of a firm. Internal factors where operating cycle, operating cash flow, leverage, size, ROA, Tobin's q and growth with industry dummy and level of economic activity has external macroeconomics factors.Uyar (2009) has examined industry benchmarks for CCC in case of merchandising and manufacturing companies and has found that the merchandising industry has a shorter CCC than manufacturing industries. He has further examined the relationship between the length of the CCC and the size of the firms the findings indicate a significant negative correlation between the length of CCC and the firm size in terms of both net sales and total assets. The study further shows significant negative correlation between the length of CCC and the profitability.Amarjit Gill, Nahum Biger, Neil Mathur (2010), in their paper, seek to extend Lazaridis and Tryfonidis' findings regarding the relationship between WCM and profitability.

3. Objectives:

- To analyse & evaluate working capital management with respect to track off between liquidity& profitability.
- To establish a relationship between working capital management & profitability of 5 selected Indian cement companies over a period of 5 years from 2015 to 2019.
- To analyse relationship asset liquidity & relative finance liquidity in cement industry.
- To draw concluding remarks on working capital management & profitability of selected cement companies by examining the effectiveness of working capital management practices of the sample firms.
- Minimization of the cash conversion cycle.
- Maintaining an appropriate level of working capital resources to ensure operational and growth aspects.
- Reduction in the amount invested in the current asset.

4. Statement of the problem:

The present study is about working capital management of selected Indian cement companies. It gets idea about the performances of working capital management in the selected companies. Working capital is essential for the working of any business. A manufacturing company needs some basic capital for producing goods in order to commence sales. It has to take care of production expenses, administration expenses as well as selling expenses. This study analyses the efficiency of working capital position of selected companies. It has identified areas which can be improved. Also, the study has made suggestion to help the management of companies to better Utilise corporate resources. It analyses the efficiency of working capital management and its components i.e. Inventory, cash and bank balances, and various current liabilities. The study attempt to determine the efficiency and effectiveness of management in each segment of working capital. Since the net concept of working capital has been widely taken in the present study, the management of both current assets and current liabilities are also critically reviewed in due course.

5. Research Methodology:

The present study is based on upon literatures the research model is shown, which outlines the way in which examining working capital management & its impact on profitability in listed 5 manufacturing cement companies. The study covers five years period from 2015 to 2019. This study is based on secondary data which is collected from company annual report and various studies made available through library work. The collect data has been tabulated, analysed and Interpreted with the help of different working capital ratio, financial ratio, profitability, and statistical tools like Descriptive analysis, correlation, regression, has been conducted. Apart from annual report various journal, articles, magazines, and websites are used for the purpose for data collection. In order to analyse the data both working capital analysis and profitability techniques have been used in this research. So analyse working capital management like Inventory Conversion Period (ICP), Debtors Conversion Period (DCP), Creditors Conversion Period (CCP), Earning Before Interest & Tax has been calculated and for profitability measurement of Cash Conversion Period (CCC). Correlation test has been applied to test degree of relationship among working capital ratio and profitability ratios. Thus, further to analyse the combined impact of working capital ratios on profitability ratio multiple regression tests have been employed.
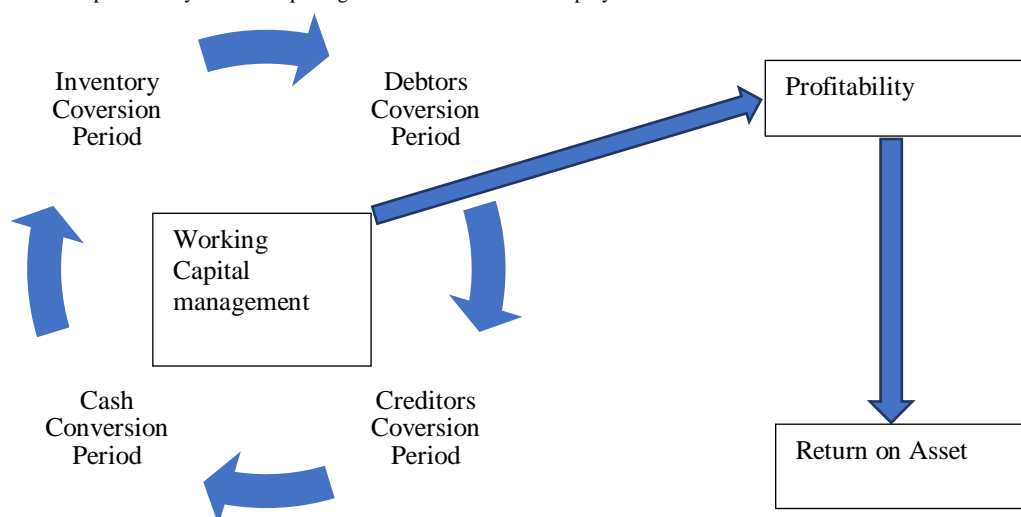

Table-1: Working Capital and Profitability Ratio

Types of ratio	Explanations	Calculation
Working Capital Ratio		
Inventory Conversion Period (ICP)	ICP is the time required to convert inventory into cash.	$\dfrac{\text{Average Stock value} *365}{\text{Cost sale}}$
Debtors Conversion Period (DCP)	DCP is the time required to collect the cash from debtors.	$\dfrac{\text{Average Debtors} *365}{\text{Net Credit sales}}$
Creditors Conversion Period (CCP)	CCP is the length of time the firms are able to defer payments on various resource purchases.	$\dfrac{\text{Average Creditors} *365}{\text{Cost of sales}}$
Cash Conversion Cycle (CCC)	CCC is the length of time between a firm's purchase of inventory and the receipt of cash from account receivable.	CCC=ICP+DCP-CCP
Profitability Ratio		
Return on Asset (ROA)	It is based on the relationship between the sales and total assets of a firm.	$\dfrac{\text{Net sales}}{\text{Total Assets}} *100$

5.1 variable:

The variables used in this study based on previous researches about the relationship between working capital management and profitability.

5.1.1 ICP: -

Number of days inventories used as proxy for the inventory policy is an independent variable. It is calculated as (inventories x 365)/ cost of goods sold**.**

Table-2

	ICP				
Year	Anjani Portland Cement	JK Cement	India cement	Shree cement	Deccan cement
2015	451	335	333	708	712
2016	192	232	321	657	397
2017	395	286	307	765	464
2018	303	251	261	743	364
2019	145	243	294	671	374

5.1.2 DCP: -

Number of days accounts receivable used as proxy for the collection policy is an independent variable. It is calculated as (accounts receivable x 365)/sales**.**

Table-3

	DCP				
Year	Anjani Portland Cement	JK Cement	India cement	Shree cement	Deccan cement
2015	24	15	38	28	27
2016	16	15	46	22	5
2017	21	14	37	14	8
2018	24	15	44	17	9
2019	29	15	47	23	9

5.1.3 CCP: -

Number of days accounts payable used as proxy for the payment policy is an independent variable. It is calculated as (accounts payable x 365)/ cost of goods sold.

Table-4

	CCP				
Year	*Anjani Portland Cement*	*JK Cement*	*India cement*	*Shree cement*	*Deccan cement*
2015	84	132	452	225	152
2016	70	142	384	207	150
2017	221	217	384	205	25
2018	226	304	340	345	16
2019	131	177	344	190	27

5.1.4 EBIT: -

Earnings before interest and taxes (EBIT) is an indicator of a company's profitability. EBIT can be calculated as revenue minus expenses excluding tax and interest. EBIT is also referred to as operating earnings, operating profit, and profit before interest and taxes.EBIT= Net profits+Interest+Taxes, EBIT= Revenue - operating expenses

Table-5

	EBIT				
Year	Anjani Portland Cement	JK Cement	India cement	Shree cement	Deccan cement
2015	41.39	306.72	468.7	447.33	45.87
2016	59.17	348.96	594.68	1411.24	94.65
2017	83.79	798.29	798.67	2873.06	100.69
2018	41.96	660.2	380.58	1954.39	65.89
2019	38.4	666.67	350.31	1346.21	81.74

5.1.5 CCC: -The cash conversion cycle used as a comprehensive measure of working capital management is another independent variable. It is calculated as (number of days accounts receivable + number of days inventory – number of days accounts payable).

Table-6

	CCC				
Year	Anjani cement	JK cement	India cement	Shree cement	Deccan cement
2015	390	216	-78	511	587
2016	137	128	-2	472	251
2017	195	88	-26	575	446
2018	101	-17	-27	416	357
2019	43	96	-5	509	356

Table-7

	Average				
VARIABLE	ICP	DCP	CCP	EBIT	CCC
2015	507.8	26.4	209	262.002	173.2
2016	359.8	20.8	190.6	501.74	102.2
2017	443.4	18.8	210.4	930.9	-27.6
2018	384.4	21.8	246.2	620.6	496.6
2019	345.4	24.6	173.8	496.66	399.4

In this table calculated average on ICP, DCP, CCP, EBIT, CCC of years from 2015 to 2019 for calculation of Descriptive analysis, Regression analysis, correlation analysis.

6. Data analysis and interpretation:

Data Analysis: The process of assessing data using diagnostic and logical reasoning to examine each component of the data provided. This form of analysis is just one of the many steps that must complete when conducting a research experiment. Data from various sources is assembled, studied, and then analysed to form some sort of outcome or conclusion.

Statistical techniques: Arithmetic mean, standard deviation, coefficient of variation, coefficient of correlation, regression and student t-test.

6.1 Descriptive Analysis:

A descriptive data point may be an outline data point that quantitatively describes or summarizes options from a set of data, whereas descriptive statistics is that the method of victimisation and analysing those statistics. Some measures that are unremarkably want to describe a knowledge set are measures of central tendency and measures of variability or dispersion. Measures of central tendency embrace the mean, median and mode, whereas measures of variability embrace the quality deviation (or variance), the minimum most values of the variables, kurtosis and lop-sidedness. Use in applied math analysis: Descriptive statistics offer easy summaries concerning the observations that are created. Such summaries are also either quantitative, i.e. outline statistics, or visual, i.e. easy to know graphs. These summaries could either type the premise of the initial description of the info as a part of a lot of in depth applied math analysis, or they will be enough in and of themselves for a selected investigation. the employment of descriptive and outline statistics has an intensive history and, indeed, the easy tabulation of populations and of economic knowledge was the primary manner the subject of statistics appeared. a lot of recently, a set of account techniques has been developed underneath the heading of beta knowledge analysis. In the business world, descriptive statistics provides a helpful outline of the many varieties of knowledge. as an example, investors and

brokers could use a historical account of come behaviour by playacting empirical and analytical analysis on their investments so as to create higher finance selections within the future. The Descriptive data are calculated based on average of ICP, DCP, CCP, EBIT, CCC, for five years data, mean, median, mode, standard deviation, minimum, maximum, largest, smallest, & sample variance, that values are shown in the below.

Table-7: Descriptive analysis

	ICP	*DCP*	*CCP*	*EBIT*	*CCC*
Mean	408.16	22.48	206	562.3804	228.76
Standard Error	30.01002	1.3544	12.07974	108.9541	96.35379
Median	384.4	21.8	209	501.74	173.2
Mode	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	67.10446	3.028531	27.01111	243.6287	215.4536
Sample Variance	4503.008	9.172	729.6	59354.96	46420.27
Kurtosis	-0.51542	-1.34474	0.790178	1.447909	-1.86295
Skewness	0.909098	0.223086	0.592811	0.652222	0.213982
Range	162.4	7.6	72.4	668.898	524.2
Minimum	345.4	18.8	173.8	262.002	-27.6
Maximum	507.8	26.4	246.2	930.9	496.6
Sum	2040.8	112.4	1030	2811.902	1143.8
Count	5	5	5	5	5
Largest (1)	507.8	26.4	246.2	930.9	496.6
Smallest (1)	345.4	18.8	173.8	262.002	-27.6

6.2 Regression Analysis:

In applied mathematics modelling, multivariate analysis could be a set of applied mathematics processes for estimating the connection between dependent variables (or outcome or response variables) and one or a lot of freelance variables (or predictors or covariates or instructive variables or features). The foremost common kind of multivariate analysis is rectilinear regression, within which one finds the road (or a lot of advanced linear combination) that principally closely fits the information in line with a selected mathematical criterion. For specific mathematical reasons, this permits the investigator to estimate the conditional expectation (or population average value) of the variable quantity once the freelance variables withstand a given set of values. Less common sorts of regression use slightly completely different procedures to estimate various location parameters (e.g., quantile regression or necessary condition analysis) or estimate the conditional expectation across a broader assortment of non-linear models (e.g., statistic regression). In this below table the regression model is used for analysis of results for the profitability of the firms which is measured by EBIT, being dependent variable and independent variables are DCP, ICP, CCP, CCC. Calculated by regression, multiple regression, R square, Adjusted R square that is (65535). &also calculated ANOVA, coefficients values are shown in the below table. The model also points out that intercept of the equation is 507.8, 26.4, 209, 262.02, 173.2 which shows that the earnings are expected to decrease by 74%.

Table-8: Regression analysis

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	65535
Standard Error	0
Observations	4

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	5	1	#NUM!	#NUM!
Residual	0	0	65535		
Total	5	5			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2018.7565	0	65535	#NUM!	2018.756	2018.7565	2018.7565	2018.7565
507.8	0	0	65535	#NUM!	0	0	0	0
26.4	0	0	65535	#NUM!	0	0	0	0
209	-0.0358463	0	65535	#NUM!	-0.03585	-0.035846	-0.0358463	-0.0358463
262.002	0.0064575	0	65535	#NUM!	0.006457	0.0064575	0.0064575	0.00645749
173.2	0.0081783	0	65535	#NUM!	0.008178	0.0081783	0.0081783	0.00817829

6.3 Correlation Analysis:

Financial correlations measure the relationship between the changes of two or more financial variables over time. For example, the prices of equity stocks and fixed interest bonds often move in opposite directions: when investors sell stocks, they often use proceeds to buy bonds and vice versa. In this case, stock and bond prices are negatively correlated. Financial correlations play a key role on modern finance. Under the capital asset pricing model, an increase in diversification increases the return/risk ratio. Measures of risk include value at risk, expected shortfall, and portfolio return variance.

Table-9 Correlation analysis

	ICP	DCP	CCP	EBIT	CCC
2015	1				
2016	0.277098	1			
2017	0.312325	-0.22664	1		
2018	-0.17233	-0.88457	0.232151	1	
2019	-0.44133	0.428292	0.254608	-0.31306	1

7. Limitation of the study

    a.   The study is restricted to a sample size of 5 companies in India and is confined to analysis of only 5 years data from 2015 to 2019.

    b.   The effect of inflation has not been considered in the present study.

    c.   The result of analysis is subject to same constraint are applicable to statistical tools.

    d.   Since the report is exclusively made from data from secondary sources, direct observation is not possible; limitation of secondary data is applicable.

    e.   There was no scope for gathering sufficient financial information since such information is, by default, confidential.

    f.   The data collected for the study was historic in nature, so the suggestions might be irrelevant to certain situations.

    g.   Analysis of this study is based on historical data, which has got its own limitations.

    h.   Important financial explanatory variable is taken into account which are extracted from the most reliable and authentic data source for arriving at a logical conclusion.

    i.   In India, companies adopt different years for closing their books of accounts. Some companies close their books of accounts on 31st March, some on 30th June, some on 30th September and some on 31st December as per the records shown in the database of BSE listed companies. So far as selection of dependent and independent variables are concerned, selected companies are made uniform as per their year-ending practices.

8. Conclusion

Working capital management (WCM) is that the practical space of finance that covers all current accounts of the firm. It involves therelationship between a firm's short-run assets and its short-run liabilities. A firm is needed to take care of a balance between liquidity and gain whereas conducting its every day operations. Liquidity may be a requirement condition to confirm that a firm is able to meet its short-run obligations and its continuing flow can even be secured from a profitable venture. The importance of money as AN indicator of continuous money health shouldn't be shocking visible ofits crucial role at intervals thebusiness organisation. The goal of assets management is to confirm that a firm is in a position to continue its operations andthat it's the flexibility to satisfy each maturing short-run debt and coming operational expenses. So, the management ofworking capital involves managing inventories, assets, accounts due and money.A firm will be terribly profitable if it interprets the money from operations at intervals constant operative cycle. If this can be impossible, thefirm my got to borrow to support its continuing assets wants. Thus, the dual objectives of gain and liquiditymust be well-synchronized. Investments in current assets square measure inevitable to confirm delivery of products or services to the final wordcustomers, and correct management of constant fulfils the required impact on either gain or liquidity. If resources square measureblocked at totallydifferent stages of the provision chain, this can prolong the money operative cycle. though this may increaseprofitability (due to extend in sales), it's going to additionally adversely have an effect on the gain if the prices pledged in assets exceedthe benefitsof holding a lot of inventory and/or granting a lot of trade credit to customers.

REFERENCES:

- Awalakki Manjunath (2020) "working capital management efficiency and return on current assets with reference to national stock exchange of India listed metal index firms" international journal of multidisciplinary of educational research, volume:9, issue:5(8)
- Chakraborty, P.K. and Bandopadhyay, K. (2007), "Strategic Working Capital Management: Case of a Turnaround Company", ICFAI Reader.
- Raheman, A. and Nasr, M. (2007), "Working capital management and profitability – Case of Pakistani firms", International Review of Business Research Papers, 3(1), 279-300.
- Singh, J.P. and Pandey, S. (2008), "Impact of Working Capital Management in the Profitability of Hindalco Industries Limited", The ICFAI University Journal of Financial Economics.
- Singh, P. (2008), "Inventory and Working Capital Management: An Empirical Analysis", The ICFAI University Journal of Accounting Research.
- Shin, H. H., and Soenen, L. (1998), "Efficiency of Working Capital Management and Corporate Profitability", Journal of Financial Practice & Education, Vol. 8(2), 37– 45.
- Soenen, L.A., (1993), "Cash conversion cycle & corporate profitability", Journal of Cash Management, Vol. 13(4), Page 53 –58.
- Uyar, Ali, "The Relationship of Cash Conversion Cycle with Firm Size and Profitability: An Empirical Investigation in Turkey", International Research Journal of Finance and Economics, 24, 186-193, 2009.
- Afza, T., & Nazir, M. (2009). Impact of aggressive working capital management policy onfirms' profitability. The IUP Journal of Applied Finance, 15(8), 20-30.
- Filbeck, G. and Krueger, T. (2005), "An Analysis of Working Capital Management Results Across Industries", American Journal of Business, Vol. 20 No. 2, 11-20. Retrieved from, https://doi.org/10.1108/19355181200500007.
- Arunkumar O.N & T. RadhaRamanan. (2013) Working Capital Management and Profitability: A Sensitivity Analysis. International Journal of Research and Development - A Management Review (IJRDMR). Volume-2, Issue – 1, 52-58.
- Oscar Torres-Reyna., (2007). Panel Data Analysis Fixed and Random Effects using Stata (v. 4.2), princeton.edu, from https://www.princeton.edu/~otorres/Panel101.
- Paneldata: pooled OLS vs RE vs FE effects, (2017). https: stats.stackexchange.com/questions/ /280578/panel-data-pooled-ols-vs-re-vs-fe-effects.
- Wikipedia contributors. (2019, July 29). Random effects model. In Wikipedia, The Free encyclopedia retrieved 08:50 September 7, 2019, from https://en.wikipedia from.org/w/index,.php?title=Random_effects_model&oldid=908413213.
- Wahieda, et. al. (2016). Working Capital Management Efficiency: A Study on the Small Medium Enterprise in Malaysia, Procedia Economics and finance. (35), 297-303. Retrieved from, DOI: 10.1016/S2212-5671(16)00037-X.