

THE IMPACT OF WORKING CAPITAL MANAGEMENT ON PROFITABILITY – AN EMPIRICAL ANALYSIS OF FERTILIZER INDUSTRY IN INDIA

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Abstract

Adequate working capital management is essential for successful running and growth of business. It aims at proper management of current assets along with identifying sources of financing them as well as ensuring liquidity and profitability trade-off. It also deeply affects the profitability of the firm. The present study focuses on empirically analyzing the impact of working capital management on profitability in fertilizer industry. For this purpose a sample of 10 fertilizer companies for a period of 10 years from 2001-2002 to 2010-11 was analyzed. The effect of different variables of working capital management viz. cash conversion cycle, average collection period, average inventory conversion period, average payables period, current ratio along with other variables such as size of firm, fixed financial assets ratio, financial debt ratio and growth of firm was studied. The results provided strong negative relationship of average inventory conversion period, average payables period, current ratio and financial debt ratio with profitability of the company. However, significant positive relationship between size of the firm and profitability came up during the study. Previous studies deduced strong negative relationship between cash conversion cycle and debt collection period with profitability but insignificant positive relationship was found in the current study. On the whole it was deduced that efficient working capital management helps in creating shareholders value and improving firm's performance.

Keywords: *Cash Conversion Cycle, Current Ratio, Debt Ratio, Fertilizer Companies, Profitability, Size of Firm, Working Capital Management*

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1. Introduction

Working capital is the basic necessity of every business unit. Every organization whether, profit oriented or not, irrespective of size and nature of business, requires necessary amount of working capital. Working capital is the most crucial factor for maintaining liquidity, survival, solvency and profitability of the business. Working capital is often referred to as the excess of current assets over the current liabilities. The need for working capital comes into existence due to the time gap between production and realization of cash from sales. There are further sub time gaps such as those between purchase of inventory items and production, production and sales and conversion of sales into cash.

Working capital has attained an immense importance because of the need to strike a balance between liquidity and profitability. In today's era where business costs are increasing, profits are squeezing and resources are becoming scarcer, working capital management has gained all the more importance requiring administration appraisal. Consequently, working capital matters consume a considerable portion of financial manager's and staff's time (Van Horne and Wachowicz, 2008).

It is, in fact, the most important facet of overall financial management. Working capital management is a managerial function which concentrates on maintaining adequate levels of both gears of working capital i.e. current assets and current liabilities. The focus of efficient working capital management is on two aspects; first is to plan and control current assets and current liabilities in manner that weeds out the risk of inability to meet short term obligations and second to avoid excessive investment in current assets (Eljelly, 2004). Working capital management (WCM) also requires making a trade-off between risk and return (Al-Debi'e, 2011).

The manner in which the working capital is managed has a significant impact on the profitability of firms (Deloof, 2003). Working capital management remarkably affects the operational efficiency of economical unit and finally the firm's value and stockholders' wealth (Ahmadi, Arasi and Garajafary, 2012).

The components of current assets basically include inventory, receivables, cash and bank and cash equivalents. Each component has an impact on the bottom line of the company. Investment in various constituents of current assets carries an opportunity cost which in turn affects profitability. Liquidity and profitability are closely related. However, both generally, conflict with each other. A high liquidity position involves huge funds blocked in working capital and

loss on the opportunity to earn returns on the said investment in some other profitable avenues and *vice versa*. The objectives of maintaining adequate profitability and liquidity carry equal importance and a balance needs to be struck between them. This leads to the statement that if profits are not taken care of, a firm cannot survive for a longer period and if liquidity is not paid heed to, a firm may face the problem of insolvency (Dong and Su, 2010). Working capital management efficiency can be measured in terms of cash conversion cycle. Since a strong association exists between the cash conversion cycle of a firm and its profitability, the three components of cash conversion cycle (accounts payables, accounts receivables and inventory) can be managed in different ways so as to maximize profitability (Lazaridis and Tryfonidis, 2006).

India is basically an agrarian economy. Though contribution of agriculture and its allied spheres to GDP has declined over the years being 13.9% in the year 2011-12 (Economic Survey, 2011-12) but still more than 60 per cent of the workforce draws its sustenance from this sector in one way or the other (Mani, Bhalachandran and Pandit, 2011). The five years plans have always laid emphasis and lend support for self-sufficiency and self-reliance in food grain production and the efforts so made have shown itself in the form enhance production and productivity in agriculture sector. This is amply displayed by the production levels achieved since the year 1950-51 to 2010-11 where the food grain production touched the appreciable mark of 244.78 million tonnes (Economic Survey, 2011-12). In this entire scenario, fertilizers play a pivotal role among other factors and here comes the crucial role played by fertilizer industry in India.

Fertilizer industry has come a long way since its inception in the year 1906 with the maiden production unit of Single Super Phosphate (SSP) being established at Ranipet near Chennai. Now numerous fertilizer plants have been set under public, private and cooperative sector. While the fertilizer industry is self-reliant in production of nitrogenous fertilizers and partially phosphatic fertilizers, it is still dependent on import of potash based fertilizers. Various policies have been framed and implemented by the Government of India for the growth and development of the industry. The industry is also making rapid strides towards its progress by entering into joint ventures, expansion of existing plants and setting up new production facilities, exploring alternative sources of raw material for fertilizer manufacturing etc. The fertilizer industry has both opportunities and challenges in its way to glory. The aim should be to exploit the opportunities to the fullest and combat challenges in the best interest of the nation, agriculture

sector and industry itself. The fertilizer industry is the core industry of India's industrial base and looking at the prospects and challenges faced by it, efficient and efficacious management of working capital so as to positively impact profitability becomes inevitable.

Keeping in view the importance of fertilizer companies and the role played by them in the Indian agricultural sector and economy and the need for adequate working capital management, the present study examines the relationship between profitability and working capital management as measured through cash conversion cycle and its components of the selected fertilizer companies. This study adds to the research base on relationship between working capital management and profitability. With its special focus on fertilizer industry, it also provides uniqueness to the study.

2. Review of Literature

A number of studies have been conducted in the past on relationship between working capital management and profitability in different countries from different angles and under different environments. The quintessence of such studies is given as follows:

Shin and Soenen (1998) studied the connection between working capital management and shareholders' wealth maximization. They analyzed a sample of 58,985 firms covering a period from 1975 to 1994. The results of the study showed that working capital management had considerable relationship with liquidity as well as the profitability of the firms. With the help of regression and correlation analysis, they concluded an inverse association between profitability and net trade cycles.

Padachi (2006) conducted a study on 58 Mauritian small manufacturing firms covering a period of 1997-98 to 2002-03 with the aim of examining the trends in working capital management and its affect on firm's profit performance. He emphasized that a well planned, constructed and implemented working capital management system aids in the creation of firm's value. The study measured profitability in terms of return on assets and discovered negative association of profits with investment in inventory and receivables.

Ganesan (2007) conducted a study on the working capital management efficiency of sample 349 companies in telecommunication equipment industry enveloping a period from 2001 to 2007. The study discovered an inverse relation between "days working capital" and profitability but the same wasn't significantly affecting the profitability of firms. He also promulgated that in order to

optimize the working capital, the investment in current assets should be reduced to minimum while attaining maximum possible returns. He also stated that efficient working capital management boosts firms' free cash flow and improves firms' growth prospects and return to shareholders.

Raheman and Nasr (2007) examined the effect of various variables of working capital management on net operating profitability of the firms. For this purpose they took a sample of 94 Pakistani firms listed on Karachi Stock Exchange for a period from 1999 to 2004. They advocated that Pakistani firms' performance was significantly connected to working capital management. A significant negative relationship between liquidity and profitability was also churned out during the analysis.

Teruel and Solano (2007) stated the vitality of working capital management for small and medium-sized companies. They carried out the research to provide empirical evidence in regard to the influence of working capital management on the profitability of small and medium-sized Spanish firms covering the period 1996-2002. They confirmed the significance of working capital management in building value in small and medium-sized firms.

Falope and Ajilore (2009) stressed that more efficient management of working capital leads to shareholder value creation. They examined 50 Nigerian quoted non-financial firms for the period 1996-2005 for influence of working capital management on profitability. They inferred that reducing the number of days accounts receivable and inventory would have a positive impression on firm's value.

Mohamad and Saad (2010) analyzed the influence of working capital management on the performance of firms from the angle of market valuation and profitability. The analysis was carried out on 172 listed companies from Bursa Malaysia from 2003 to 2007. The results of correlations and multiple regression analysis showed that significant negative associations existed between working capital variables and firm's performance. Also, the criticality of managing working capital to improve firm's market value and profitability was stated by them.

Charitou, Elfani and Lois (2010) investigated the impact of working capital management on financial performance of firm in an emerging market. A total of 43 companies listed on Cyprus Stock Exchange for the period 1998-2007 were studied. The research concluded that efficient working capital management leads to improvement in profitability. They propounded that

optimum utilization of firm's resources helps in reducing volatility and enhancing profits which in turn lowers the default risk and improves value of the firm.

Hayajneh and Yassine (2011) examined the relationship between working capital efficiency and profitability covering 53 Jordanian manufacturing firms listed in Amman Exchange Market for the period 2000-2006. They inferred significant negative relationship existed between profitability and cash conversion and its components viz. average inventory conversion period, average receivable collection period and average payment period. A positive association prevailed between profitability of the firms and the growth and size of sales and current ratio. The study recommended shortening of cash conversion cycle in order to gain optimal profitability.

Vijayakumar (2011) investigated the bearing of cash conversion cycle on the profitability of a sample of 20 firms belonging to Indian automobile industry for a period 1996-2009. He also studied the impact of size, growth, leverage and GDP on profitability of the companies. He advocated that reducing cash conversion cycle has a positive effect on improving the bottom line. A positive relationship of size, growth and GDP with profitability was observed while leverage has negative affiliation with firms' profitability.

Ahmadi, Arasi and Garajafary (2012) investigated the impact of working capital management and profitability on a sample 33 companies pertaining to food industry listed on Tehran Stock Exchange for the period 2006-2011. The effect of various components of working capital on profitability measured through net operating profit of the firm was analyzed. They arrived at the conclusions that reverse relationship existed between profitability and cash conversion cycle and its components and by reducing debt collection period, debt settlement period and inventory conversion period, profitability could be hiked.

Ray (2012) going by the earlier studies analyzed the bearing of working capital and its components viz. debt collection period, inventory collection period and debt settlement period on profitability of firms. He further included other variables such as current ratio, debt ratio, size of firm and financial assets to total assets ratio in his study for testing the impact on profitability. He took a sample of 311 Indian manufacturing firms for a period wrapping 1996-1997 to 2009-2010. He deduced a negative affiliation between profitability and measures of working capital management. However, he found an insignificant association between average days of accounts payable and profitability.

Ogundipe, Idowu and Ogundipe (2012) performed analysis on sample 54 companies on listed on Nigerian Stock Exchange for the period 1995-2009 with the aim of investigating the impact of working capital management on firms' performance and market value. The results of the study confirmed significant negative association between cash conversion cycle and market valuation and firm's performance. The study also established an inverse relationship of debt ratio and firm's performance. They stated that adequate management of working capital leads to improvement in firms' profitability and market value.

3. Objectives of the Study

The objectives of the study are as follows:

- a) To investigate the relationship of working capital management efficiency with the profitability.
- b) To examine association between liquidity and profitability.
- c) To determine the relationship between financial debt ratio and the profitability.
- d) To assess the relationship between size of the firm and profitability.

4. Methodology

This portion of the study deals with the sample and data, hypotheses so framed, variables and model specifications used.

4.1 Sample and Data

The entire fertilizer industry is divided into three sectors viz. cooperative sector, public sector and private sector. From each sector major companies were selected as sample based on stratified sampling and random sampling techniques. Hence, 10 companies in total constitute the sample for study covering a period of 2001-2011 i.e. ten years. The study is based on the secondary data acquired from the annual reports of the respective companies for the aforementioned period.

4.2 Hypotheses

The hypotheses for the study have been framed and tested keeping in view the objectives of the study. Following are the null hypotheses for the study:

- H_1 : There is no relationship between the working capital management and the profitability.
- H_2 : There is no relationship between the liquidity and the profitability.

- H₃: There is no relationship between size of the firm and the profitability.
- H₄: There is no relationship between financial debt ratio and the profitability.

4.3 Variables

The variables have been classified as dependent variable and independent variables. The dependent variables include profitability measure i.e. Gross Operating Profitability (GOP) computed as follows:

$$\text{GOP} = (\text{Sales} - \text{Cost of Goods Sold}) / (\text{Total Assets} - \text{Financial Assets})$$

Independent variables have been further divided into two categories. First category contains working capital management efficiency variables briefed as follows:

- Average Collection Period (ACP) calculated as $\text{ACP} = \text{Account Receivables}/\text{Sales} * 365$
- Average Inventory Conversion Period (AICP) computed as $\text{AICP} = \text{Inventory}/\text{Cost of Goods Sold} * 365$
- Average Payment Period (APP) measured as $\text{APP} = \text{Accounts Payables}/\text{Cost of Goods Sold} * 365$
- Cash Conversion Cycle (CCC) used to express the general working capital management efficiency is derived as $\text{CCC} = \text{ACP} + \text{AICP} - \text{APP}$

Second category is of control variables covering the following:

- Size of the Firm (LNS) = Natural Logarithm of sales
- Firm Growth (Growth) = $(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}$
- Current ratio (CR) = Current assets/Current Liabilities
- Fixed Financial Assets Ratio (FFAR) = Fixed Financial Assets/Total Assets
- Financial Debt Ratio (FDR) = $(\text{Short Term Loans} + \text{Long Term Loans}) / \text{Total Assets}$

4.4 Model Specifications

To study the nature and extent of the impact of various variables on profitability, correlation and regression analysis have been conducted. The study uses Pearson correlation analysis to assess the degree of association between assorted variables of the study. A Pearson correlation matrix has been constructed for determining the relationship between independent variables with dependent variable.

The study utilizes the pooled regression type of panel data analysis. Under such type of analysis, several cross-sectional units are inspected over a period of time. This method is not only beneficial in for evaluating the dynamics of adjustment but also identifies and measure impacts

which may not be traced in pure cross-sections or pure time-series data (Raheman & Nasr, 2007). Hence, more dependable forecasts may be arrived at. Therefore, with a view to test the hypotheses, the general appearance of model is as follows:

$$Y_{it} = \beta_0 + \sum_{\text{all}}^n \beta_i X_{it} + \varepsilon$$

where Y_{it} = GOP of firm i at time t ($i = 1, 2, \dots, 10$ firms and $t = 1, 2, \dots, 10$ years)

β_0 = Intercept of equation

β_i = Coefficients of X_{it} variables

X_{it} = Different independent variables of firm 'i' at time 't'.

ε = Error term

In line with studies carried on in the past, the above model is made specific as per the following equations, to learn about the bearing of working capital management efficacy on firm's profitability:

$$\text{Model 1: } GOP = \beta_0 + \beta_1 (ACP_{it}) + \beta_2 (CR_{it}) + \beta_3 (FFAR_{it}) + \beta_4 (FDR_{it}) + \beta_5 (LNS_{it}) + \beta_6 (\text{Growth}_{it}) + \varepsilon$$

$$\text{Model 2: } GOP = \beta_0 + \beta_1 (AICP_{it}) + \beta_2 (CR_{it}) + \beta_3 (FFAR_{it}) + \beta_4 (FDR_{it}) + \beta_5 (LNS_{it}) + \beta_6 (\text{Growth}_{it}) + \varepsilon$$

$$\text{Model 3: } GOP = \beta_0 + \beta_1 (APP_{it}) + \beta_2 (CR_{it}) + \beta_3 (FFAR_{it}) + \beta_4 (FDR_{it}) + \beta_5 (LNS_{it}) + \beta_6 (\text{Growth}_{it}) + \varepsilon$$

$$\text{Model 4: } GOP = \beta_0 + \beta_1 (CCC_{it}) + \beta_2 (CR_{it}) + \beta_3 (FFAR_{it}) + \beta_4 (FDR_{it}) + \beta_5 (LNS_{it}) + \beta_6 (\text{Growth}_{it}) + \varepsilon$$

5. Empirical Results

This section of the study covers the results of the analysis performed. The presentation of descriptive analysis is followed by correlation analysis and then regression analysis.

5.1 Descriptive Analysis

Descriptive analysis covers the minimum, maximum, mean, standard deviation, median, quartiles of all the variables considered in the study. All these criteria for various variables have been tabulated under Table 1.

As shown by Table 1, GOP presents an average value of 25.41% with a standard deviation of 9.95%. The minimum value obtained is -2.22% while the maximum value is 60.38%. The first

quartile i.e. Q1, for GOP, stands at 18.92 while the second quartile i.e. Q2, also referred to as median is 26.64% and finally the third quartile i.e. Q3 occurs as 31.22%.

The AICP averages 73.85 days with a standard deviation of 41.43 days. The minimum and maximum for AICP is 20.21 days and 283.95 days respectively. The value of Q1 is 46.71 days and that of median is 64.79 days whereas Q3 is 88.08 days. It means that 25% of the AICP lies up to 46.71 days, 50% up to 64.79 days and 75% up to 88.08 days. The mean value for ACP is 51.46 days and the standard deviation for same is 35.60 days. The minimum number of days a firm takes to collect its debts is 1.85 days while the maximum number of days for this activity is 240.94 days. The values for Q1, median and Q3 are 26.71 days, 50.85 days and 71.41 days respectively. The average of APP is 62.66 days while standard deviation is 44.14 days. The minimum time taken for settlement of payables or in other words the credit period availed is 15.52 days while the maximum time is 263.37 days. Q1 shows 32.65 days whereas median displayed a value of 50.38 days and Q3 shows 74.42 days. CCC presents an average of 62.65 days along with a standard deviation of 44.20 days. The minimum value obtained for CCC is -9.41 days which is a sort of unrealistic value as it simply means that the APP is more than combined AICP and ACP. The maximum of CCC is 179.98 days. The computed value of Q1 is 22.81 days, Q2 is 61.54 days and Q3 is 90.78 days.

In order to check the liquidity position of the firm, CR is used. The average CR for fertilizer companies is 2.63 with a standard deviation of 1.25. The minimum and maximum value of CR is 0.88 and 8.16 respectively. The respective quartiles values are 1.75, 2.32 and 3.04.

FFAR averages 0.08 with a standard deviation of 0.11. The minimum value is 0.00 while maximum value is 0.44. FDR represents the relationship between external financing and total assets. It gives a mean value of 0.33 along with a standard deviation of 0.23. The minimum of FDR is 0.00 meaning that no external financing is used at all whereas the maximum value shown is 1.09. Size of the firm represented by the natural logarithm of sales, gives an average value of 7.67 with a standard deviation of 1.11. The minimum and maximum value of LNS is 4.36 and 10.40. The growth of firm is denoted by change in sales. Growth shows an average of 0.19 with a standard deviation of 0.39. The minimum Growth recorded is -0.49 while the maximum Growth is given at 1.71.

Table 1
Descriptive Statistics

Variables	Mean	S.D.	Minimum	Maximum	Q1	Q2/ Median	Q3
GOP	25.41	9.95	-2.22	60.38	18.92	26.64	31.22
AICP	73.85	41.43	20.21	283.95	46.71	64.79	88.08
ACP	51.46	35.60	1.85	240.94	26.71	50.85	71.41
APP	62.66	44.14	15.52	263.37	32.65	50.38	74.42
CCC	62.65	44.20	-9.41	179.98	22.81	61.54	90.78
CR	2.63	1.25	0.88	8.16	1.75	2.32	3.04
FFAR	0.08	0.11	0.00	0.44	0.00	0.04	0.11
FDR	0.33	0.23	0.00	1.09	0.16	0.30	0.46
Size of Firm	7.67	1.11	4.36	10.40	7.09	7.80	8.33
Growth	0.19	0.39	-0.49	1.71	-0.01	0.13	0.26

5.2 Correlation Analysis

Table 2 exhibits the Pearson correlation matrix among variables with focus being on the connection between the independent variables with the dependent variable. The table discloses that a negative correlation exists between AICP and GOP as supported by a negative coefficient of -0.493 with a p-value of 0.000 which implies that the correlation is highly significant at $\alpha = 0.01$. This leads to the inference that reducing the days of inventory held by the firm would have a significant incremental effect on the profitability. The result of correlation analysis between ACP and GOP shows a negative correlation i.e. -0.192 but the same is not significant as the p-value is 0.057 which is neither significant at $\alpha = 0.01$ or $\alpha = 0.05$. This guides to the conclusion that though decrease in days of debt collection would enhance profitability but the impact wouldn't be significant. Correlation results between APP and GOP presents a trend akin to AICP. The coefficient of correlation is negative being -0.526 which again is highly significant at $\alpha = 0.01$ since the p-value equals 0.000. This indicates that more the time taken to settle down the payables lesser will be the profitability of the firm. In other words, less profitable firms have a longer accounts payables payment period. CCC, which is taken as a combined measure of working capital management efficiency, has a weak negative correlation with profitability i.e. -0.091 which is not significant. However, it still implies that profitability can be enhanced by cutting down the number of days involved in CCC.

A very feeble negative relationship between CR and GOP is obtained. The correlation coefficient between CR and GOP is -0.015 which is not significant due to high p-value of 0.879. Nevertheless, it supports the adverse association said to exist between liquidity and profitability. Again an insignificant positive correlation exists between FFAR and GOP as shown by the results of correlation analysis. The coefficient of correlation is 0.155 with a p-value of 0.125 making the relationship insignificant. However, it depicted that increase of financial assets in the total assets structure would positively affect profitability. FDR has a negative relationship with GOP. The outcome of correlation analysis revealed a significant negative connection between the amount of external financing and profitability. The correlation coefficient is -0.471 with a p-value of 0.000 which is highly significant at $\alpha = 0.01$. Size of firm measured as natural logarithm of sales has a positive relationship with GOP being 0.603 which again is quite significant at $\alpha = 0.01$ due to p-value of 0.000. This indicates that increasing sales definitely moves the profitability in the same direction and hence, building the size of firm leads to improvement in performance of the firm. However, same significant results are not derived for Growth. Growth shows a positive relationship with GOP but the same is not significant as the p-value is 0.632. A positive correlation of 0.049 exists between Growth and GOP. This entails that increase in sales has a conducive impact on profitability of the firm.

Another observation made is that CCC has significant positive relationship with AICP and ACP. The coefficient of correlation for both relationships is 0.356 and 0.691 respectively. This specifies that increase in days linked to holding inventory and collection of receivables would lead to amplification in the number of days of CCC. The coefficient of correlation for CCC and APP is -0.110 but is not significant. This proves that reduction in CCC can be achieved also by increasing the period for payment to creditors or suppliers.

Hence, the above results confirm that reducing the inventory holding period along with debt collection period and payment period would have favourable influence on the performance and profitability. On the whole, it can be said that containing CCC would enhance profitability. The results of the correlation analysis are consistent with earlier studies taken on this subject.

Table 2
Correlation Analysis

Variables	GOP	AICP	ACP	APP	CCC	CR	FFAR	FDR	LNS	Growth
GOP	1									
AICP	-.493** .000	1								
ACP	-.192 .057	.165 .102	1							
APP	-.526** .000	.716** .000	.270** .007	1						
CCC	-.091 .370	.356** .000	.691** .000	-.110 .278	1					
CR	-.015 .879	-.158 .119	-.080 .433	-.435** .000	.222* .027	1				
FFAR	.155 .125	-.355** .000	-.230* .022	-.348** .000	-.171 .091	.311** .002	1			
FDR	-.471** .000	.229* .0224	.253* .012	.419** .000	.001 .995	-.304** .002	-.214* .033	1		
LNS	.603** .000	-.523** .000	-.252* .012	-.606** .000	-.089 .382	.229* .023	.358** .000	-.223* .026	1	
Growth	.049 .632	-.042 .680	-.186 .065	.047 .643	-.236* .019	-.163 .107	.134 .187	.119 .240	.046 .653	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

5.3 Regression Analysis

In order to assess the impact of working capital management and its components on the performance of the firm i.e. profitability, panel data (pooled) regression has been used. As aforementioned, four models have been developed to test the relationships so discussed. Model 1 is concerned with determining the relationship of debt collection period with the profitability, Model 2 is used to assess the relationship of inventory conversion period with profitability, Model 3 relates to evaluating the impact of payables settlement period on profitability and finally Model 4 contemplates the effect of CCC on profitability. A total of 100 observations representing stacked data for the period 2002-2011 for 10 fertilizer companies are investigated. In addition to above, certain additional tests such as test for multicollinearity and model fit and its significance are also performed.

To assess the model fit or ability of the independent variables to explain the variance in the dependent variables, there are primarily three statistics namely R which is a measure of correlation between the actual and the predicted value of the dependent variable, R^2 also known as coefficient of multiple determination is the proportion of the variance in the dependent variable that is explained by the independent variables and Adjusted R^2 which is similar to R^2 but is adjusted for number of parameters or variables and observations used in the model or equation. Adjusted R^2 is always smaller than R^2 since the former tends to correct the inflation in magnitude in latter occurring on account of number of independent variables in the regression equation by taking into account the number of variables and observations (Bryman and Cramer, 2005). Hence, Adjusted R^2 is a better measure of model performance. To test the significance of the model F-test is used.

Multicollinearity is a situation where high correlations exist between two or more independent variables. Multicollinearity is problem because it makes it difficult to recognize the unique contribution of each variable in predicting the dependent variable as extremely correlated variables will be giving the same results for dependent variable (Matignon, 2005). In order to check for multicollinearity tolerance and variance inflation factor (VIF) are used. If VIF is more than 10 or tolerance is less than 0.10, multicollinearity exists (Wooldridge, 2009).

The results of regression analysis for *Model 1* are summed up in Table 3 and 4. As shown by Table 3, Adjusted R^2 shows a value of 0.528 which implies that 52.8% of the variation in the dependent variable is explained by the model. The model is highly significant as the value of F equals 19.242 which is significant at $\alpha = 0.01$ or 1% significance level. From Table 4, the regression equation derived is $GOP = 0.01 ACP - 2.02 CR - 6.75 FFAR - 19.28 FDR + 5.35 LNS + 1.32 Growth - 4.35$. Looking at the equation, it can be interpreted that 1 unit (day) increase in ACP keeping all other variables constant will improve GOP by 0.01 unit (%). The results shows that granting more credit period will enhance profitability as shown by positive coefficient of 0.01 but the impact is not significant as shown by t-test. CR and FDR show significant negative relationship while LNS shows significant positive association with profitability at 1% significance level. If CR is increased by 1 unit then GOP will go down by -2.02 units (%) and if FDR is increased by 1 unit then GOP will dip down by -19.28 units (%). Similarly, if LNS rises by 1 unit, GOP increases by 5.35 units (%). The regression coefficients for FFAR and Growth

are -6.75 and 1.32 and are not significant. The result of multicollinearity test is negative i.e. it is absent since VIF for all predictor variables is less than 10 and tolerance is more than 0.1.

Table 3
Model Summary

Model	R	R ²	Adjusted R ²	S.E.	F	Sig.
1	0.746	0.557	0.528	6.837	19.242	0.000

a. Predictors: (Constant), Growth, LNS, FDR, CR, ACP, FFAR

b. Dependent Variable: GOP

Table 4

Multiple Regression Statistics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-4.35	5.79		-0.75	0.454		
	ACP	0.01	0.02	0.04	0.59	0.559	0.85	1.18
	CR	-2.02	0.62	-0.25	-3.28	0.001	0.81	1.24
	FFAR	-6.75	7.45	-0.07	-0.91	0.367	0.77	1.29
	FDR	-19.28	3.29	-0.45	-5.85	0.000	0.82	1.21
	LNS	5.35	0.69	0.60	7.76	0.000	0.82	1.22
	Growth	1.32	1.90	0.05	0.70	0.488	0.89	1.12

a. Dependent Variable: GOP

Model 2 replaces ACP with AICP whereas rest of the variables remains the same. As shown by Table 5, Adjusted R² depicts a value of 0.561 indicating that 56.1% of the variability in the dependent variable is explained by the model. The model is highly significant as the value of F equals 21.839 which is significant at $\alpha = 0.01$. As per Table 6, the equation turns out to be $GOP = -0.05 AICP - 1.95 CR - 11.00 FFAR - 17.70 FDR + 4.42 LNS + 1.09 Growth + 7.05$. The relationship between AICP and GOP is found to be negative which is highly significant. The regression coefficient is -0.05 which means that for every 1 day decrease in inventory holding period (keeping all other variables fixed) GOP would enhance by 0.05%. It can be deduced that reducing the time of holding inventory would augment the profitability of the fertilizer

companies. The regression coefficients for CR, FDR and LNS are -1.95, -17.90 and 4.42 respectively which are all significant at 1% significance level. As regard the FFAR and Growth they are not significantly related to GOP and the regression coefficients for same are -11.00 and 1.09 respectively. This implies that increase in sales and decrease in the amount of financial assets in the total asset structure lead to a favourable impact on performance of the firm. All the independent variables have VIF ranging between 1-1.5 and tolerance between 0.68-0.92 signaling that multicollinearity does not exist among the predictors in the regression model.

Table 5

Model Summary

Model	R	R ²	Adjusted R ²	S.E.	F	Sig.
2	0.766	0.588	0.561	6.594	21.839	0.000

a. Predictors: (Constant), Growth, LNS, FDR, CR, ACP, FFAR

b. Dependent Variable: GOP

Table 6

Multiple Regression Statistics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
2	(Constant)	7.05	6.56		1.07	0.285		
	AICP	-0.05	0.02	-0.22	-2.70	0.008	0.68	1.46
	CR	-1.95	0.59	-0.25	-3.29	0.001	0.81	1.24
	FFAR	-11.00	7.28	-0.12	-1.51	0.134	0.75	1.33
	FDR	-17.90	3.12	-0.42	-5.74	0.000	0.86	1.17
	LNS	4.42	0.73	0.49	6.05	0.000	0.68	1.48
	Growth	1.09	1.80	0.04	0.60	0.547	0.92	1.08

a. Dependent Variable: GOP

In *Model 3*, APP comes into picture with all other predictors being same. Table 7 reveals that the model is able to account for 56.00% of the variability in the dependent variable as displayed by Adjusted R^2 of 0.560. The model is quite significant at 1% significance level with F value of 21.758. The equation, as visible from Table 8, for Model 3 goes as $GOP = -0.06 APP - 2.49 CR - 8.52 FFAR - 16.37 FDR + 4.19 LNS + 1.18 Growth + 9.26$. A negative association (-0.06) is highlighted between APP and GOP which is quite significant at 1% significance level. This guides to the inference that any reduction in the payables settlement period will foster the profitability of the company. Akin to previous models CR, FDR and LNS showed significant associations with profitability with regression coefficients being -2.49, -16.37 and 4.19 respectively while FFAR and Growth depicted insignificant relationships with firm's profitability with regression coefficients being -8.52 and 1.18 respectively. The VIF being in the range of 1.08-2.04 implied absence of multicollinearity for this model.

Table 7

Model Summary

Model	R	R ²	Adjusted R ²	S.E.	F	Sig.
3	0.766	0.587	0.560	6.601	21.758	0.000

a. Predictors: (Constant), Growth, LNS, FDR, CR, ACP, FFAR

b. Dependent Variable: GOP

Table 8

Multiple Regression Statistics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
3	(Constant)	9.26	7.12		1.30	0.196		
	APP	-0.06	0.02	-0.25	-2.66	0.009	0.49	2.04
	CR	-2.49	0.62	-0.31	-4.01	0.000	0.74	1.35
	FFAR	-8.52	7.17	-0.09	-1.19	0.238	0.78	1.29
	FDR	-16.37	3.24	-0.38	-5.05	0.000	0.79	1.26
	LNS	4.19	0.78	0.47	5.38	0.000	0.60	1.66

	Growth	1.18	1.80	0.05	0.66	0.513	0.92	1.08
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a. Dependent Variable: GOP

In order to test the impact of CCC on profitability *Model 4* is built. Table 9 reveals that the model is able to account for 52.6% variation in the dependent variable since the Adjusted R² stands at 0.526. The model is highly significant at 1% significance level with an F value of 19.132. From Table 10, the equation which emerges for Model 3 is $GOP = 0.004 CCC - 2.05 CR - 6.87 FFAR - 18.89 FDR + 5.30 LNS + 1.18 Growth - 1.18$. In contrast to the existing study findings, no significant relationship is noticed between CCC and GOP. The regression coefficient is 0.004 for CCC. However, the positive coefficient reveals that any increase in CCC would lead to profitability. This might be possible in a scenario when increase in credit period to customers lead to increase in sales, lower payment period helps in availing discounts and high inventory holding period reduces the risk of stock outs. All this may lead to increase in profitability. However similar observation of positive relationship between CCC and profitability was made by Attari and Raza (2012). CR, FDR and LNS again generate significant affiliations with profitability with regression coefficients being -2.05, -18.89 and 5.30 respectively and FFAR and Growth once again exhibited insignificant relationship with firm's profitability with regression coefficients being -6.87 and 1.18 respectively. The VIF being in the range of 1.11-1.34 and tolerance ranging between 0.75-0.90 amply state that multicollinearity is absent from the model.

Table 9

Model Summary

Model	R	R ²	Adjusted R ²	S.E.	F	Sig.
4	0.745	0.555	0.526	6.848	19.132	0.000

a. Predictors: (Constant), Growth, LNS, FDR, CR, ACP, FFAR

b. Dependent Variable: GOP

Table 10

Multiple Regression Statistics

Model	Unstandardized	Standardized	t	Sig.	Collinearity
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		Coefficients		Coefficients			Statistics	
		B	Std. Error	Beta			Tolerance	VIF
4	(Constant)	-3.55	5.62		-0.63	0.529		
	CCC	0.004	0.02	0.02	0.23	0.821	0.86	1.17
	CR	-2.05	0.64	-0.26	-3.20	0.002	0.75	1.34
	FFAR	-6.87	7.56	-0.07	-0.91	0.366	0.75	1.33
	FDR	-18.89	3.22	-0.44	-5.86	0.000	0.86	1.16
	LNS	5.30	0.68	0.59	7.75	0.000	0.84	1.20
	Growth	1.18	1.89	0.05	0.62	0.534	0.90	1.11

a. Dependent Variable: GOP

6. Conclusions

Working capital management is an important aspect of financial management and deeply affects the performance of the firm. It is crucial to efficiently manage the working capital of the firm so that the desired results can be attained. Keeping in view the importance of working capital management, present study focuses on analyzing the impact of working capital management and its components on profitability. For this a purpose 10 companies belonging to fertilizer industry of India were selected for a period of ten years in the range 2002-2011 where the financial year ends on 31st March. Working capital management was measured in terms of CCC, ACP, AICP and APP. However, certain other control variables viz. CR, FFAR, FDR, LNS and Growth were chosen to study their impact on profitability. The results of the study, on the whole, are consistent with the prior studies on this issue. A significant negative relationship of AICP and APP with profitability is found. However, CCC and ACP are positively linked to profitability but their impact may not be considered significant as revealed by t-test. Therefore, profitability of fertilizer industry can be enriched by reducing the number of days of inventory holding period and reducing the payables payment period. Increasing the credit period to customers would have positive impact on profit, broadly, in a situation where it leads to increase in sales. In totality working capital management do influence the direction of profitability. Hence, we reject null hypothesis (H_1) and conclude that working capital management and its components are related to profitability.

As regard the hypothesis (H_2) pertaining to relationship between liquidity measured through CR and profitability, it is concluded that significant negative relationship exists between both of them. Any increase in current ratio would adversely impact the profitability which is line with general notion of inverse relationship between liquidity and profitability. Hence, a proper trade-off between the two is essential to enhance shareholders' value. Also the third null hypothesis (H_3) of no relationship between size of the firm and profitability stands rejected as significant positive relationship between the two is found. This, hence, leads to the fact increase in the size of the firm would have a positive bearing on the profit performance of the firm. The final hypothesis (H_4) is also rejected as FDR and profitability are inversely yet significantly associated. The deduction arrived is that increase in the use of external financing in relation to total assets will lead to reduction in profitability. Hence, attempts should be made to utilize debt in the firm to optimum extent so as to improve profitability.

The above findings are consistent with previous studies such as inverse relationship of working capital management's components with profitability as stated by Deloof (2003), Eljelly (2004), Raheman and Nasr (2007) except for the relationships found in case of CCC and ACP. There is further scope of conducting research on this topic by covering all the companies of the fertilizer industry and also extending the number of years. The scope of further research may also include analysis of cash and its equivalents and bank and taking into account other measures of profitability like ROI and using more variables affecting the profitability of the firms.

Appendix 1: Abbreviations

S. No.	Abbreviation	Full Name
1	ACP	Average Collection Period
2	AICP	Average Inventory Conversion Period
3	APP	Average Payment Period
4	CCC	Cash Conversion Cycle
5	CR	Current ratio
6	FDR	Financial Debt Ratio
7	FFAR	Fixed Financial Assets Ratio
8	GOP	Gross Operating Profitability
9	Growth	Firm Growth
10	LNS	Natural Logarithm of Sales/Size of the Firm
11	Q1	Quartile 1
12	Q2	Quartile 2/Median
13	Q3	Quartile 3
14	R ²	Coefficient of Multiple Determination
15	ROI	Return on Investment
16	S.D.	Standard Deviation
17	S.E.	Standard Error of Estimation
18	Sig.	Significance or p-value
19	VIF	Variance Inflation Factor
20	WCM	Working Capital Management

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