

Impact of Working Capital Management on Firm's Profitability: Evidence from the Fuel and Power Companies Listed on the Dhaka Stock Exchange

Shabnaz Amin *
Mohammad Anisul Islam **

***Abstract:** This study investigated the impact of working capital management on the profitability of fifteen listed fuel and power companies in Bangladesh. The ratios used for this study to measure the working capital efficiency included time interest ratio (TIE), quick ratio (QR), cash conversion cycle (CCC), accounts receivables collection period (ARCP), accounts payable payment period (APP), inventory processing period (IPP), cash to current liability (CCL), cash to sales (CTS) ratios and net working capital (NWC) turnover and debt to equity ratio (D/E). The corporate profitability was measured by return on assets (ROA) and net profit margin (NPM). The data were collected from the annual reports of the companies from 2007 to 2011. Analysis of multiple regression and correlation matrix reveals that measurable association exists between the dependent and selected independent variables. NPM and TIE showed significant positive relations with ROA while CCL and accounts payables payment period (APP) showed a significant positive influence on NPM and D/E exhibited significant negative influence on NPM.*

***Keywords:** Working Capital, Profitability, Cash Conversion Cycle, Average days of collection period, Inventory turnover period, Deferred payables Period, Efficiency ratio, Net working capital turnover.*

Introduction

The importance of impact of working capital management on firms' profitability is a critical issue to conceive. In this study, fifteen fuel and power companies of Bangladesh listed in Dhaka Stock Exchange (DSE) were selected to assess the relationship among the working capital efficiency indicators and the profitability measures of the companies. Dependency of profitability ratios over working capital components and liquidity positions of these companies was figured out to justify the necessity of efficient working capital management. Working Capital is the third critical decision field of corporate financial management where proper concentration by management is essential. Working

* Assistant Professor, Department of Finance, University of Dhaka

** Erstwhile Intern, Research Division, Lanka Bangla Securities Limited

Capital is intimately related to current account which basically measures the amount of current assets and current liabilities of a firm. Working Capital can be defined as capital required for maintaining day-to-day operations of the company. Companies need to manage working capital as effectively as possible by financing or investing activities, so that the optimum level of working capital can be maintained.

Profitability ratios like net profit margin, return on equity and return on assets are commonly used ratio to measure efficiency and effectiveness of a particular company's operation. Increasing the efficiency of working capital is one of the ways to achieve higher profitability. In connection with this, there are a number of ratios that can be used to measure the efficiency of working capital of a company [(Hayajneh and Yassine (2011)]. The first ratio is related to the liquidity factor of the company. Liquidity is defined as the ability of the company to meet its financial obligations. Current ratio (as one of the indicators of the company's liquidity position) measures the company's ability to meet its short term debts. Generally, the current ratio of two is satisfactory for the company. Current ratio is too high when it indicates the presence of excess working capital compared to what is needed presently. If this occurs, it is likely to create idle funds and an increase in opportunity cost, such as storage costs and maintenance costs, which in turn, also decrease the profitability and vice versa.

Another factor is the receivable turnover which measures the number of times the average receivables are turned over during a year. The higher this ratio, the better it is because it shows that the working capital invested in the form of receivables, is collected at a rapid pace. This will have an impact on the increase in the profitability.

The third factor is the net working capital turnover. It measures the amount of sales revenue earned for each company's net working capital. Net working capital is the difference of current assets to current liabilities. The higher this ratio the better it is, as it indicates that the company has been effective in managing net working capital. This will naturally have a positive impact on the profitability. Based on the above arguments and in line with the thinking of Hayajneh and Yassine (2011) paper, this study attempts to assess the relationship between firm's profitability and working capital management efficiency to prove that the greater the working capital efficiency ratio, the more efficient management of current assets by an enterprise to generate profit.

Table 1: Comparison of Working Capital Ratio and Profitability Ratio over the years

Variables/Period	2007	2008	2009	2010	2011
Current Ratio	1.74	1.79	1.83	2.13	1.99
Cash Conversion Cycle	338.27	297.76	350.87	48.60	66.05
Net Working Capital Turnover	16.44	15.10	13.62	-91.31	9.15
Return on Assets	5.31%	5.33%	6.76%	9.13%	9.12%
Net Profit Margin	13.98%	19.47%	18.93%	19.65%	19.30%

Source: Annual Reports of the selected companies in fuel and power sector of Bangladesh

Table 1 shows the key variables that are chosen to get a glimpse of the overall performance of fuel and power sector of Bangladesh from 2007 to 2011. The fuel and power industry's current ratio had an increasing trend for last 4 years from 2007 to 2010 and it reached at 2.13 in 2010 and in 2011 it reached at standard level of two approximately. In addition, cash conversion cycle showed a declining trend which is undoubtedly a good indicator for working capital efficiency. ROA of the companies increased to maximum 9.13 percent and 9.12 percent in 2010 and 2011 respectively. With the decrease in cash conversion cycle over the last 5 years and increase in net profit margin and return on assets over the period from 2007 to 2011, it can be said that overall the industry performed well in terms of working capital management.

Overview of Fuel and Power Sector of Bangladesh

The Government of Bangladesh through the Ministry of Energy and Mineral Resources (MEMR) bears overall responsibility for the power sub-sector in Bangladesh. Consumption of commercial energy per head in Bangladesh is one of the lowest in Asia, if not the world. A lack of commercially priced sources of electricity has been a major factor in deterring foreign investment hindering GDP growth. Bangladesh Power Development Board (BPDB) website shows that the country had 4,942 MW (with a maximum generation capacity of 3,268 MW) installed power generation capacity on January 6, 2009 and per capita electricity generation increased from 110 kWh in 1997-98 to 321 kWh per annum (including captive generation) in 2013. With about 62% of households receiving electricity, most commercial energy is consumed by industrial and residential customers. Bangladesh's installed electric generation capacity has increased significantly from 4,942 MW in 2009 to 10,000 MW in October 2013. As the installed

power generation facilities are now able to generate 6,000 MW of power consistently, regular power outage for prolonged periods has been reduced significantly. If fuel supply could be secured, additional 1,000 plus megawatt electricity could be generated (Source: BPDB). There has been a reduction of natural gas-based power generation capacity to nearly 68% (6,587 MW) and increase in imported fuel oil based power generation to nearly 26% in 2013. The share of hydroelectricity and coal-fired power generation remains limited within 5%. Bangladesh became grid connected with Indian power transmission line for the first time from October 5, 2013, and 250 MW power has been imported to our grid. It is expected that within the next few weeks 250 MW more electricity would start to flow from Indian to Bangladeshi power networks (Source: The Daily Star November 13, 2013).

Table: 2 Power Sector of Bangladesh at a glance

Sl. No.	Items	As of December 2013
1	Generation Capacity, MW	10,264 MW
2	Maximum Generation, MW	6080 MW
3	Net Generation, MkWh (FY 2012-September 2013)	47,357
4	Transmission Line (Ckt KM)	9,300
5	Distribution Line (KM)	290,000
6	Total Consumers (Million)	14.2
7	Per Capita Generation, KWH	321
8	Access to Electricity	62%

Source: Bangladesh Power Development Board (BPDB) website: <http://www.bpdb.gov.bd/bpdb/>

Until February 2013, 15 fuel and power companies have been listed in Dhaka and Chittagong Stock Exchanges under fuel and power sector. These companies are leading companies in fuel and power industry of Bangladesh. Although there are significant differences among these companies in terms of ownership, business model, capital structure, business operation and so forth. The Dhaka Stock Exchange has listed all these companies in the same category. Table 3 states the category and the year of listing of these companies.

Table 3: List of Selected Companies by their Market Category and Listing Year

Companies	Market Category	Listing Year
Linde Bangladesh Limited	A	1976
Eastern Lubricants	A	1976
Padma Oil Company	A	1976
Bd. Welding Electrodes	B	1999
Summit Power	A	2005
Dhaka Electric Supply Company Ltd.	A	2006
Power Grid Company of Bangladesh Ltd.	A	2006
Meghna Petroleum Limited	A	2007
Jamuna Oil Company Limited	A	2007
Titas Gas Transmission and Distribution Company Ltd.	A	2008
Khulna Power Company Limited	A	2010
Mobil Jamuna	A	2011
Barakatullah Electro Dynamics Ltd.	A	2011
GBB Power Ltd.	A	2012
Summit Purbanchol Power Company Limited	N	2013

Source: www.dsebd.org

Performance of Fuel and Power Companies

Table 4 summarizes the performance of listed fuel and power companies in terms of average return on assets (ROA), average net profit margin (NPM), and average sales growth of each incumbent company for the study period from of 2007 to 2011. Industry average is calculated by taking average of ROA, NPM, and Sales Growth of all companies. The industry average of return on assets (ROA) is 7.16%, net profit margin (NPM) is 18.74%, and sales growth rate is 21.85%.

Table 4: Performance Summary of Fuel and Power Companies (2007-2011)

Companies /Particulars	ROA (%)	Deviation from Industry (%)	NPM (%)	Deviation from Industry (%)	Sales Growth (%)	Deviation from Industry (%)
Linde Bangladesh Limited	20.00	12.84	17.82	-0.93	15.58	-6.27
Eastern Lubricants	3.87	-3.30	98.38	79.63	42.02	20.16
Bd. Welding Electrodes	1.07	-6.09	3.39	-15.36	23.07	1.21
Summit Power	8.52	1.36	33.80	15.06	35.52	13.67
Dhaka Electric Supply Company	5.79	-1.38	12.94	-5.80	13.12	-8.73
Power Grid Company of Bangladesh Ltd.	2.34	-4.82	24.14	5.40	5.36	-16.49
Padma Oil	11.61	4.45	0.58	-18.16	18.45	-3.40
Meghna Petroleum	2.90	-4.26	0.70	-18.04	14.32	-7.53
Jamuna Oil	4.78	-2.38	0.97	-17.78	18.44	-3.41
KPCL	8.42	1.26	5.74	-13.01	13.34	-8.52
Mobil Jamuna	7.80	0.64	10.22	-8.52	23.63	1.78
Titas Gas	13.95	6.78	10.79	-7.96	10.69	-11.16
GBB Power	2.95	-4.21	11.27	-7.47	27.61	5.76
Barakatullah Electro Dynamics	5.22	-1.95	23.28	4.54	35.22	13.37
Summit Purbanchol Power	8.22	1.06	27.12	8.38	31.43	9.57
Industry Average	7.16	-	18.74	-	21.85	-

In terms of ROA, Linde Bangladesh Limited, Summit Power, Padma Oil, KPCL, Mobil Jamuna, Titas Gas, and Summit Purbanchol Power had outperformed the industry and other companies underperformed the industry. In terms of NPM, Eastern Lubricants, PGCB, Barkatullah Electro Dynamics and Summit Purbanchol Power outperformed the industry and other companies underperformed the industry. Sales growth rate of the fuel and power industry is much higher as consumption of fuel and power is highly correlated with economic development. Eastern Lubricants, Bd. Welding Electrodes, Summit Power, Mobil Jamuna, GBB Power, Barakatullah Electro Dynamics, and Summit

Purbanchol Power ride on the wave of this high sales growth by outperforming the industry while other companies' sales growth is below than industry average.

Figure 1: Performance of Fuel and Power Companies

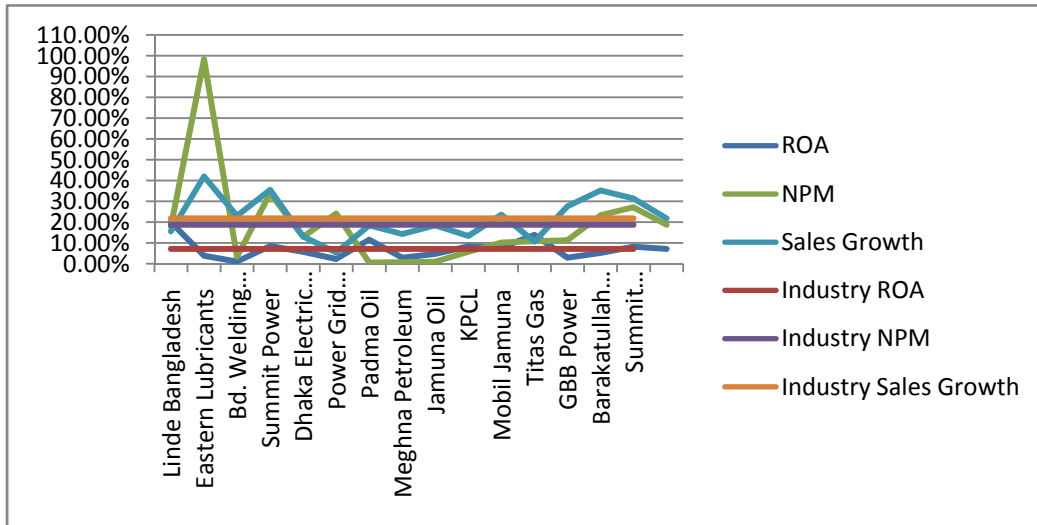


Figure 1 shows the performance graphically. Linde Bangladesh had standout performance in industry in terms of both NPM and Sales Growth. Bangladesh government has announced Fiscal incentives and incentives for foreign investors to facilitate the investment in the power plants. Exemption from corporate income tax for a period of 15 years has been announced for the investors. They are also allowed to import plant and equipment and spare parts up to a maximum of ten percent (10%) of the original value of total plant and equipment within a period of twelve (12) years of commercial operation without payment of customs duties. For foreign investors, government announced tax exemption on royalties, technical know-how and technical assistance fees. The foreign investors are also exempted from paying tax on interest on foreign loans. They are also enjoying tax exemption on capital gains from transfer of shares by the investing company. These incentives dictates many fuel and power companies will be established by investors in upcoming period which will make this fuel and power industry vibrant and ensure social and economic development of Bangladesh.

Literature Review

Study conducted by Hayajneh and Yassine (2011) investigated the relationship between working capital efficiency and profitability on the 53 Jordanian manufacturing firms listed in Amman Exchange Market for the period from 2000 to 2006. Descriptive statistics, Pearson correlation coefficients, ordinary least squares (OLS) and two stage least squares (2SLS) regressions model were used to analyze the data series in this study.

The study found a negative significant relationship between profitability and the average receivable collection period, average conversion inventory period and average payment period, and also the cash conversion cycle which expresses the efficiency of working capital. Their study revealed a positive significance between the size of the firm, growth of sales and current ratio from this side and profitability from other side. Finally, financial leverage correlated negatively with profitability. Regression results of this study recommended the firms to manage its working capital efficiently to achieve the optimal profitability.

Weinraub and Visscher, (1998) used quarterly data for the period 1984-93 of the US firms to analyze the issue of aggressive and conservative working capital management. To examine the relative relationship between aggressive/conservative working capital policies, they considered 10 diverse industry groups and found that the industries had distinctive and significantly different working capital management policies. These researchers discovered the long stability of working capital policies over the 10-year study period. The study found a high and significant negative correlation exist between industry asset and liability policies and found that when relatively aggressive working capital asset policies are followed, they are balanced by relatively conservative working capital financial policies.

Moyer, Mcguigan and Kretlow (1995, p. 11) found that working capital consists of a large portion of a firm's total investment in assets, 40 percent in manufacturing and 50 percent to 60 percent in retailing and wholesale industries respectively. Scherr (1989, p. 16) claimed that by implementing best practices in working capital, companies can strengthen strong cash flow levels, improve profitability, budgeting and forecasting process.

The relationship of cash conversion cycle with firm size and profitability for firms listed at Istanbul Stock Exchange was studied by Uyar, (2009) using ANOVA and correlation analysis. The results showed retail/wholesale industry has shorter Cash Conversion Cycle (CCC) than manufacturing industries. Furthermore, study found significant negative correlation between CCC and profitability as well as between CCC and firm size.

Padachi, (2006) has examined the trends in working capital management and its impact on firm's performance for 58 Mauritian small manufacturing firms during 1998 to 2003. He explained that a well designed and implemented working capital management is expected to contribute positively to the creation of firm's value. The results indicated that high investment in inventories and receivables is associated with low profitability and also showed an increasing trend in the short term component of working capital financing.

To test the relationship between working capital management and corporate profitability, Deloof (2003) used a sample of 1,009 large Belgian non-financial firms for a period of 1992-1996. By using correlation and regression tests, he found significant negative relationship between gross operating income and the number of days accounts receivable, inventories, and accounts payable of Belgian firms.

Tahmina, (2011) took the companies enlisted with the cement industry of Dhaka Stock Exchange to investigate the effects of working capital management efficiency as well as maintaining liquidity on the profitability of these companies. Her analysis covered a time period from year 2005 to 2009. The purpose of her paper was to establish a relationship between working capital components efficiency of cement companies and profitability of these companies which is statistically significant. The other purpose was to help explain the necessity of firms optimizing their level of working capital management and maintaining enough liquidity as it affects the profitability. Her study revealed a significant relationship exists between liquidity as well as working capital components and profitability of these cement companies.

Naimulbari (2012) in his study found that all the components of working capital have a significant effect on the profitability in the pharmaceuticals industry in Bangladesh. His study disclosed a negative relationship between corporate profitability and cash conversion cycle which indicates that the cash conversion cycle is longer, profitability is smaller. As the cash conversion cycle has the negative relationship with the profitability, this cycle should be short as much as possible without hurting the operations. This would improve profits, because the longer the cash conversion cycle, the greater the need for external financing, and that financing has a cost. Pharmaceuticals companies have much scope to reduce their cash conversion cycle by compressing the debtor conversion period.

Lots of studies have been conducted showing the relationship between working capital efficiency and its impact on overall profitability of firms both home and abroad on different industries. But no such study has been done so far on fuel and power industry of Bangladesh. So this study is expected to reduce that gap in the literature and will contribute to the knowledge of different stakeholders associated with this sector to take informed decision about how managing working capital efficiently will impact the profitability of a firm.

Objective of the Study

The major objective of this study is to assess the relationship between working capital efficiency and the profitability of selected power and fuel companies listed in DSE. The specific objectives of the study can be summarized as follows:

- a. To identify the working capital efficiency indicators that influence the profitability measures
- b. To measure the nature and extent of dependence of profitability on working capital management
- c. To analyze the relationship between the liquidity and the profitability
- d. To assess the relationship between financial leverage position and the profitability
- e. To recommend measures for enhancing firm's profitability

Data and Methodology

The study was primarily based on the secondary source of information. The secondary data were collected from annual reports of fifteen listed fuel and power companies in the Dhaka Stock Exchange from 2007 to 2011. Padma Oil Company Limited (POCL), Jamuna Oil Company Limited (JOCL), and Meghna Petroleum Limited (MPL) work as affiliated companies for Bangladesh Petroleum Corporation (BPC). These companies are considered as oil marketing companies rather than producers. Prior to using the secondary source of data, they were carefully scanned and their reliability was verified. While analyzing the data, descriptive as well as inferential statistical tools were used. Besides, ratios were calculated to assess the relationship between working capital efficiency and the profitability of the selected companies. Stata 11 had been used to conduct the descriptive analysis to describe relevant aspects of phenomena of cash conversion cycle and provide detailed information about each relevant variable.

In this analysis two methods were applied. Firstly, Pearson correlation matrix was used to measure the degree of association between different variables under consideration. Secondly, to account for the effects of other construct, multivariate linear regression was applied for the hypotheses.

The variables that were used in this study were as follows: Return on Asset (ROA), Net Profit Margin (NPM), Time Interest Earned Ratio (TIE), Quick Ratio (QR), Cash Conversion Cycle (CCC), Accounts Receivables Collection Period (ARCP), Accounts Payable Period (APP), Inventory processing Period (IPP), Cash to Current Liability (CCL), Cash to Sales (CTS), Debt-Equity Ratio (D/E), and Net Working Capital Turnover (NWC turnover) ratios.

The study intended to assess the relationship between profitability indicators and other working capital components and liquidity positions. To cover the liquidity position, few cash position ratios were considered along with traditional liquidity ratios. And for the

purpose, multiple regression analysis was conducted as well. So the basic model for the study that had been followed is-

Profitability of the Firm = f (Quick Ratio (QR), Cash Conversion Cycle (CCC), Accounts Receivables Collection Period (ARCP), Accounts Payable Payment Period (APP) , Inventory Processing Period (IPP), Cash to Current Liability (CCL) , Cash to Sales (CTS), Time Interest Earned Ratio (TIE), Debt to Equity Ratio (D/E), Net working Capital (NWC) Turnover)

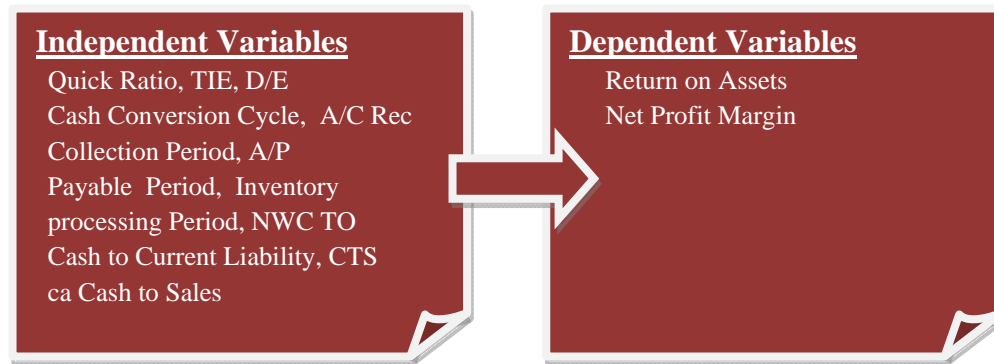


Figure 3 Conceptual Framework of Study

Hypothesis of the Study

Hypothesis that were applied to analyze the impact of working capital components on the profitability of the firm statistically were as follows:

- H 1: There is negative relationship between the components of working capital efficiency and the profitability.
- H 2: There is negative relationship between liquidity and the profitability.
- H 3: There is negative relationship between financial leverage position and the profitability.

Expected Findings

- a. A significant level of relationship between the profitability indices and various liquidity indices as well as working capital components.
- b. A negative relationship between working capital and its components' conversion cycle and profitability of the Firm.

- c. Positive relationship of profitability with the firms' cash holding position along with other indicators.
- d. Efficient management of working capital and liquidity contributes firms' profitability positively.

Empirical Analysis:

Descriptive Statistics

Table 5 presents the descriptive statistics of the study variables for 15 fuel and power firms from 2007 to 2011. This descriptive statistics include median, maximum, mean, and standard deviation of all collected variables.

The mean and median of net profit margin are more than two times of ROA, which means in most of the years these firms had a total asset turnover less than one. Firms are not using their total assets rigorously to generate more and more sales. Firms may maintain large amount assets to avoid probable breakdown of assets which may shrink future sales if not addressed timely.

Table 5: Descriptive Statistics on Parameters of Working Capital and Profitability

Ratios	Mean	Median	Standard Error	Standard Deviation	Minimum	Maximum	Confidence Level (95.0%)
ROA	0.0726	0.0497	0.0080	0.0666	-0.0158	0.2665	0.0160
NPM	0.1841	0.1109	0.0317	0.2634	-0.0631	1.4466	0.0633
TIE	43.2816	5.1074	16.3417	135.7443	0.0000	800.7640	32.6093
QR	1.4985	0.9219	0.1621	1.3467	0.0009	8.0045	0.3235
ARCP	490.6082	59.0893	215.7245	1791.9426	0.1046	9746.2409	430.4716
IPP	93.3733	49.7845	15.8728	131.8494	0.0000	551.6615	31.6737
APP	372.9374	38.3107	152.9559	1270.5467	0.0000	6599.0142	305.2186
CCC	211.0441	81.0682	73.2274	608.2729	-763.5285	3147.2267	146.1231
CCL	0.7436	0.3602	0.1172	0.9732	0.0149	4.7413	0.2338
CTS	1.2719	0.1019	0.4628	3.8444	0.0054	22.2831	0.9235
D/E Ratio	3.9696	1.7500	0.7192	5.9744	0.0024	30.4682	1.4352
NWC TO	-9.3953	2.2455	21.6913	180.1813	-1472	90.1667	43.2843

The minimum value of NPM as a measure of the profitability is -6.31% but the maximum value of NPM is 144.66%. While the mean of net profit margin is 18.41%, and the standard deviation of net profit margin from its mean is about 26.34%. This indicates the existence of moderate variations in the NPM of different companies.

The average receivables collection period (ARCP) is 0.1046 days (approximately) as minimum to collect its receivables from the customers but it takes 9746 days as maximum to pay its creditors. The average inventory processing period (IPP) is about 93 days with standard deviation of 132 days and takes 552 days as maximum. About the average payment period (APP), the firm requires 6599 days as a maximum time. It takes an average 373 days to pay its purchases with standard deviation of 1271 days. This is indicative of existence of significant variations in ARCP, IPP, APP and CCC of different companies.

Net working capital turnover (NWC Turnover) measures the dollar sales generated from per dollar invested in net working capital. Negative average NWC turnover indicates firms' ability to finance its current assets is more than sufficient. The firms need 3147 days as a maximum time from making payments to receive cash inflow and on an average 211 days from making its payments to receive its cash inflow with standard deviation of 608 days, which is significant.

Analysis of Interrelationships

The interrelationships between the chosen variables have been analyzed using correlation coefficients. The correlation matrix contains the simple Pearson correlation coefficients (Table 6). It is evident from the correlation matrix that the ROA and IPP are negatively correlated with the cash conversion cycle. This indicates that more profitable firms either delay their payment towards their suppliers-creditors or accelerate their receivables. These results are consistent with the view that the shorter the period between production and sale of products the larger is the firm's profitability.

Table 6 Correlation Coefficient Matrix

Ratios	ROA	CCC	QR	NPM	IPP	TIE	CCL	CTS	D/E	NWC
ROA	1.000									
CCC	-0.203	1.000								
QR	0.042	-0.048	1.000							
NPM	-0.038	0.582*	0.089	1.000						

IPP	-0.214	0.155	-0.077	-0.194	1.000					
TIE	0.563*	-0.069	0.213	-0.018	-0.055	1.000				
CCL	0.093	-0.016	0.836*	0.133	0.033	0.317*	1.000			
CTS	-0.190	0.812*	0.009	0.813*	-0.140	-0.083	0.058	1.000		
D/E	-0.108	-0.166	-0.224	-0.28*	-0.24*	-0.153	-0.207	-0.13	1.000	
NWC TO	-0.36*	0.011	0.028	0.038	0.035	0.017	0.0270	0.016	-0.16	1.0000

* mark indicates the significance at 5%

There is a significant positive correlation between the cash conversion cycle and net profit margin. It means if a firm loosens its credit period and hereby enhances average receivables collection period, it will increase the profitability through attracting more customers by providing them with favorable credit terms and generating more sales in this process. There is significant positive correlation between timed interest earned (TIE) and return on assets (ROA) which is quite logical. The cash to sales (CTS) and cash conversion cycle (CCC) are significantly positively related meaning when the firm reduces the length time required converting raw materials into finished goods, selling those goods and collecting receivable early; can hold more cash in response to sales. Significant positive correlation exists between cash to current liability and quick ratio as cash contributes to quick asset and between cash to sales (CTS) and net profit margin (NPM). So if the firms make their sales more in cash, it will reflect positively on profitability. Significant positive correlation between cash to current liability (CCL) and times interest earned (TIE), indicates that firms have capability to bear debt from holding more cash. All of the above correlations are consistent with the hypothesis and with previous studies. The financial leverage position of the firm (measured by D/E ratio) is negatively related to profitability (NPM), and also significant. All of the above correlation coefficients are consistent with the findings of the previous studies.

Dependence of Firm's Profitability: Multiple Regression Analysis

For assessing the nature and degree of dependence of criterion variable (profitability) on selected working capital efficiency indicators (explanatory variables) multiple regression analyses were performed. In Table 7, the summary of multiple regression of the return on assets (ROA) on selected predictor variables is shown. These variables are indicators of working capital components as well as working capital efficiency.

Table 7: Output of Multiple Regression of ROA on Selected Predictor Variables

Dependent Variable	Predictors	R Square	Adjusted R Square	Coefficient	T-Stat	P Value	Standard Error
ROA	Intercept	59.68%	51.89%	0.071897	4.394430	0.000049	0.016361
	NPM			0.115544	2.104147	0.039788	0.054913
	TIE			0.000226	4.604565	0.000024	0.000049
	QR			-0.048155	-2.082739	0.041773	0.023121
	ARCP			0.000011	0.568082	0.572211	0.000019
	IPP			-0.000175	-3.158573	0.002536	0.000055
	APP			-0.000039	-1.381758	0.172438	0.000028
	CCL			-0.003950	-0.325856	0.745727	0.012121
	CTS			-0.002348	-0.514141	0.609141	0.004566
	D/E Ratio			-0.001403	-1.229400	0.223973	0.001141
	CR			0.040644	1.881325	0.065038	0.021604
	NWC Turnover			-0.000144	-4.540699	0.000030	0.000032

Based on the coefficients given in Table 7 the following regression model can be constructed:

$$\text{ROA} = 0.0711 + 0.116 \text{ NPM} + 0.0002226 \text{ TIE} - 0.0482 \text{ QR} + 0.000011 \text{ ARCP} - 0.000175 \text{ IPP} - 0.000039 \text{ APP} - 0.00395 \text{ CCL} - 0.00235 \text{ CTS} - 0.0014 \text{ D/E Ratio} + 0.0406 \text{ CR} - 0.00014 \text{ NWC Turnover}$$

Output of Multiple Regression is indicative of the dependence of profitability indicator on selected parameters of working capital management efficiency. The value of the coefficient of multiple determination indicates that the independent variables all together explained 59.68 percent of total variations in return on asset (ROA). The results were also found statistically significant as a whole (Appendix 1). But an analysis of the coefficient-wise significance of relationship between the criterion variable and a specific predictor variable reveals that the said relationship was significant only in five cases out of eleven. It is evident from t-stat and p-value that significant relationship exists between ROA and NPM, TIE, QR, IPP and NWC turnover.

An examination of the nature and magnitude of relationship between criterion and explanatory variables reveals that the net profit margin (NPM) and time interest earned

(TIE) have positive relationship with the ROA. The coefficients indicate that ROA increases by 0.116 and 0.0002226 units for a unit change in NPM and TIE respectively, provided all other predicted variables remain constant. Other critical factors over the ROA, as observed from the above stated multiple regression model, are quick ratio (QR) and inventory processing period (IPP), which are important measures of working capital efficiency of the firm; firms which are better at reducing inventory processing period can minimize their cash conversion cycle which in turn increases their profitability. Standard quick ratio to be maintained is 2 for manufacturing firm. The negative coefficient of quick ratio indicates accumulation of unnecessary large number of current assets can cut off profitability of firms. Net working capital turnover (NWC Turnover) measures the dollar sales generated from per dollar invested in net working capital. Net working capital should be invested at optimum level in firms' operation.

Table 8 furnishes the multiple regression summary of net profit margin (NPM) on other independent variables which are indicators of working capital components as well as working capital efficiency.

Table 8: Output of Multiple Regression of NPM on Selected Predictor Variables

Dependent Variable	Predictors	R Square	Adjusted R Square	Coefficient	T-Stat	P Value	Standard Error
NPM	Intercept	84.99%	82.41%	0.157002	4.721960	0.000015	0.033249
	TIE			0.000016	0.139028	0.889910	0.000117
	QR			0.052756	0.961812	0.340137	0.054850
	ARCP			-0.000104	-2.359766	0.021673	0.000044
	IPP			-0.000052	-0.394330	0.694783	0.000132
	APP			0.000303	5.563625	0.000001	0.000055
	CCL			0.058688	2.100502	0.040043	0.027940
	CTS			0.005380	0.493821	0.623297	0.010896
	D/E Ratio			-0.008486	-3.406806	0.001200	0.002491
	CR			-0.066498	-1.306048	0.196692	0.050915
	NWC Turnover			-0.000010	-0.131676	0.895696	0.000076

The regression equation of NPM on selected working capital parameters can be written as follows:

$$\text{NPM} = 0.157 + 0.000016 \text{ TIE} + 0.05276 \text{ QR} - 0.000104 \text{ ARCP} - 0.000052 \text{ IPP} + 0.000303 \text{ APP} + 0.0587 \text{ CCL} + 0.0054 \text{ CTS} - 0.00849 \text{ D/E Ratio} - 0.0665 \text{ CR} - 0.000010 \text{ NWC Turnover}$$

As seen from the results contained in Table 8, the independent variables jointly as a whole explained 84.99% of total variations in net profit margin (NPM). The results obtained through regression model were found to be statistically significant as a whole (F value in Appendix 2), but marked variations were observed from coefficient to coefficient. From the t-stat and p-value, it is observed that significant relationship exists between criterion variable NPM and the predictor variables of ARCP, APP, CCL and debt equity ratio (D/E Ratio).

This equation shows that critical factors over the NPM are accounts receivables conversion period (ARCP), accounts payables payment period (APP), cash to current liabilities (CCL) and debt to equity ratio (D/E). Firms which are better at increasing ARCP, and APP can minimize their cash conversion cycle which in turn increases their profitability. Sufficient cash enables firm to meet its current liability instantly which gives firm opportunity to take favorable buying terms from suppliers. Debt to Equity ratio increases firms' exposure to financial risk which can reduce profitability of firm if financing cost increases over time for debt usage.

The findings of the study confirm the validity of the hypotheses that working capital management significantly affects profitability of listed fuel and power companies in Bangladesh. In the same way, first research hypothesis (H1) indicating that working capital management significantly affects profitability was proved and accepted. Working capital management has its effect on liquidity as well on profitability of the firm; therefore, the companies should maintain a balance between both.

The second hypothesis (H2) which indicated that liquidity position has a significant negative impact on profitability of the firm was proved. It was found that, higher the quick ratio, lower was the ROA of firms and therefore, the firms must set a trade-off between these two objectives so that, neither the neither liquidity nor profitability suffers.

The third hypothesis (H3) concerning that, there exist a relationship between debt financing and profitability was proved. D/E ratio has significant negative relation with NPM. So when the debt financing increased, profitability declined. In fact, debt financing affects the financial cost which would lead to decreasing profitability.

Findings and Recommendations

This study investigated the inter-linkages of working capital management and profitability using the financial statement variables of fifteen listed fuel and power companies in Bangladesh from 2007 to 2011. Analysis of multiple regression and correlation matrix revealed that measurable association exists between the dependent and selected independent variables. Out of eleven independent variables, only two variables namely, net profit margin (NPM) and time interest earned (TIE) have significant positive relationship and quick ratio (QR), inventory processing period (IPP) and net working capital turnover (NWC turnover) showed a significant negative relationship with return on assets (ROA). The other independent variables, irrespective of their nature of relationship with the criterion variable, were found to have no significant relationship with ROA.

Among the determinants of net profit margin (NPM), cash to current liability (CCL) and accounts payables payment period (APP) showed a significant positive influence, while ARCP and debt-equity ratio (D/E) exhibited a significant negative influence on net profit margin (NPM)

Quick ratio (QR) and cash to current liability both had positive relation with both return on assets (ROA), and net profit margin (NPM). Inventory processing period (IPP), and debt-equity ratio (D/E) both had negative relation with both return on assets (ROA), and net profit margin (NPM).

Based on the findings of the study, it is recommended that fuel and power firms should manage their working capital efficiently to achieve the optimal profitability. These firms should maintain optimum current assets for their daily business processing as well as for meeting their short term maturities otherwise their profitability would be affected. The firms should manage their working capital through reducing the length time between sell the goods and receive cash of sales by accelerating its collections. Besides, they should reduce the length time between conversions of the raw materials into finished goods to sell these goods. The firms should try to shorten the length time between purchase goods to pay their purchases. All of these measures will lead to a reduced cash conversion cycle and then could ensure optimal profitability.

The study suggests that there is much to be done in the area of working capital management in Fuel and Power sector of Bangladesh in future. More analytical research studies could be conducted on the same topic by extending the sample coverage by companies and time and incorporating other predictor and criterion variables and using more tests to assess the impact of working capital management and firm's profitability.

References

- Annual Reports of BOC Bangladesh Limited from 2007 to 2011
- Annual Reports of Eastern Lubricants from 2007 to 2011
- Annual Reports of Padma Oil Company from 2007 to 2011
- Annual Reports of Bd. Welding Electrodes from 2007 to 2011
- Annual Reports of Summit Power from 2007 to 2011
- Annual Reports of Dhaka Electric Supply Company Ltd. 2007 to 2011
- Annual Reports of Power Grid Company of Bangladesh Ltd. 2007 to 2011
- Annual Reports of Meghna Petroleum Limited from 2007 to 2011
- Annual Reports of Jamuna Oil Company Limited from 2007 to 2011
- Annual Reports of Titas Gas Transmission and Distribution Company Ltd. from 2007 to 2011
- Annual Reports of Khulna Power Company Limited from 2007 to 2011
- Annual Reports of Mobil Jamuna from 2007 to 2011
- Annual Reports of Barakatullah Electro Dynamics Ltd from 2007 to 2011
- Annual Reports of GBB Power Ltd. from 2007 to 2011
- Annual Reports of Summit Purbanchol Power Company Limited from 2007 to 2011
- Das, Rajib Kumar (2011). Bangladesh Equities, *Company Update*, Meghna Petroleum Limited, LankaBangla Research Publication.
- Deloof M, (2003). Does working capital management affect profitability of Belgian firms, *Journal of Business Finance and Accounting*, 30: 573-588.
- Hayajneh, Yassine (2011). The Impact of Working Capital Efficiency on Profitability – an Empirical Analysis on Jordanian Manufacturing Firms. *International Research Journal of Finance and Economics*, ISSN 1450-2887 Issue 66 (2011).
- Islam Md. Shiful, 2011. Energy Sector of Bangladesh, *Research Report*, IDLC Finance Limited.
- Moyer R. C., Mcguigan J. R., Kretlow W. J. (1995). *Contemporary Financial Management*, West Publishing Co, Cincinnati, Ohio.
- Padachi K. (2006). Trends in working capital management and its impact on firms' performance: An analysis of Mauritian small manufacturing firms. *International Review of Business Research Papers*, 2(2), 45–58.
- Quayyum Sayeda Tahmina, (2011). Effects of Working Capital Management and Liquidity: Evidence from the Cement Industry of Bangladesh, *Journal of Business and Technology (Dhaka)*, Volume–VI, Number-01, January-June, 2011.
- Scherr, F. C. (1989). *Modern Working Capital Management, Text and Cases*. Englewood Cliffs, New Jersey: Prentice-Hall International Editions.
- Uyar A. (2009). The Relationship of Cash Conversion Cycle with Firm Size and Profitability: An Empirical Investigation in Turkey. *International Research Journal of Finance and Economics*. 24.
- Weinraub H J and Visscher S (1998). Industry Practice Relating to Aggressive Conservative Working Capital Policies, *Journal of Financial and Strategic Decision*, Vol. 11, No. 2, pp. 11-18.
- Bangladesh Development Board (BPDB) website: <http://www.bpdb.gov.bd/bpdb/> accessed on February 20, 2014.
- The Daily Star (November 13, 2013)

Appendix

1. Multiple Regressions on ROA

Regression Statistics for all Working Capital Components						
Multiple R	0.772501					
R Square	0.596757					
Adj. R Square	0.518939					
Standard Error	0.046210					
Observations	69.000000					
ANOVA						
	Df	SS	MS	F	Significance F	
Regression	11.000000	0.180127	0.016375	7.668557	0.000000	
Residual	57.000000	0.121716	0.002135			
Total	68.000000	0.301843				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.071897	0.016361	4.394430	0.000049	0.039135	0.104659
NPM	0.115544	0.054913	2.104147	0.039788	0.005584	0.225505
TIE	0.000226	0.000049	4.604565	0.000024	0.000128	0.000324
QR	-0.048155	0.023121	-2.082739	0.041773	-0.094453	-0.001856
ARCP	0.000011	0.000019	0.568082	0.572211	-0.000028	0.000050
IPP	-0.000175	0.000055	-3.158573	0.002536	-0.000286	-0.000064
APP	-0.000039	0.000028	-1.381758	0.172438	-0.000096	0.000018
CCL	-0.003950	0.012121	-0.325856	0.745727	-0.028221	0.020322
CTS	-0.002348	0.004566	-0.514141	0.609141	-0.011491	0.006796
D/E Ratio	-0.001403	0.001141	-1.229400	0.223973	-0.003688	0.000882
CR	0.040644	0.021604	1.881325	0.065038	-0.002617	0.083904
NWC Turnover	-0.000144	0.000032	-4.540699	0.000030	-0.000207	-0.000080

Autocorrelation Problem and Solution

```
. tsset year
```

```
    time variable: year, 2007 to 2011
```

```
. dwstat
```

```
Durbin-Watson d-statistic( 12, 5) = .9276092
```

```
. archlm, lags (1 2 3)
```

```
LM test for autoregressive conditional heteroskedasticity (ARCH)
```

lags(p)	chi2	df	Prob > chi2
1	1.096	1	0.2952
2	3.000	2	0.2231
3	2.000	3	0.5724

```
H0: no ARCH effects vs. H1: ARCH(p) disturbance
```

Heteroskedasticity Problem and Solution

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

```
Ho: Constant variance
```

```
Variables: fitted values of roa
```

```
chi2(1) = 0.20
```

```
Prob > chi2 = 0.6527
```

2. Multiple Regressions on NPM

Regression Statistics for all Working Capital Components						
Multiple R	0.921916					
R Square	0.849929					
Adj. R Square	0.824055					
Standard Error	0.110497					
Observations	69.000000					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	10.000000	4.010636	0.401064	32.848352	0.000000	
Residual	58.000000	0.708154	0.012210			
Total	68.000000	4.718790				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.157002	0.033249	4.721960	0.000015	0.090446	0.223558
TIE	0.000016	0.000117	0.139028	0.889910	-0.000218	0.000251
QR	0.052756	0.054850	0.961812	0.340137	-0.057039	0.162551
ARCP	-0.000104	0.000044	-2.359766	0.021673	-0.000192	-0.000016
IPP	-0.000052	0.000132	-0.394330	0.694783	-0.000317	0.000213
APP	0.000303	0.000055	5.563625	0.000001	0.000194	0.000413
CCL	0.058688	0.027940	2.100502	0.040043	0.002760	0.114616
CTS	0.005380	0.010896	0.493821	0.623297	-0.016429	0.027190
D/E Ratio	-0.008486	0.002491	-3.406806	0.001200	-0.013473	-0.003500
CR	-0.066498	0.050915	-1.306048	0.196692	-0.168415	0.035420
NWC Turnover	-0.000010	0.000076	-0.131676	0.895696	-0.000161	0.000141

Autocorrelation Problem and Solution

```
. tsset year
```

```
    time variable: year, 2007 to 2011
```

```
. dwstat
```

```
Durbin-Watson d-statistic( 11, 5) = 1.252004
```

Heteroskedasticity Problem and Solution

```
. hettest
```

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
```

```
Ho: Constant variance
```

```
Variables: fitted values of npm
```

```
chi2(1) = 6.19
```

```
Prob > chi2 = 0.0129
```