Abstract
The study examined the impact of working capital management on firm profitability using quoted oil and gas companies in Nigeria for the period 2003-2013. Data were extracted from annual financial reports of selected oil and gas companies. These firms include Total Nigeria Plc, Oando Plc, Texaco Nigeria Plc., Mobil Oil Plc. and Statoil Plc. Working capital management was measured by variables such as cash conversion cycle, inventory turnover ratio, and liquidity ratio, while firm profitability was measured by return on assets (ROA). The study utilized panel data analysis in a fixed effect model, and the result of the study showed that the relationship between components of working capital management and profitability was significant, in that working capital management explained a significant proportion of variation in profitability of the firms. The study concluded that working capital management plays a significant role in the existence of the operations of oil and gas companies.

Keywords: Working capital management, inventory, profitability, panel data, oil and gas firms

1. INTRODUCTION
Working capital is a vital part of business investment which is essential for continuous business operations. It mainly represents the resources of a firm which is the portion of financial
resources of business that changes from one type of resources to another during the day-to-day execution of business. It is excess of current assets over current liabilities; that is, the amount of capital which is available to an organization that is used in carrying out its daily business operations (Akinlo, 2011). The importance of managing working capital components (receivables, inventories and payables) of a business efficiently cannot be denied because it has significant impact on the success, prosperity, power of profitability and liquidity and serves as the signs of healthiness of business organization of all sizes. If capital invested in cash, inventory or trade receivables is not sufficient, the firm may have difficult in carrying out its daily business operations. This may results in declining sales and, in end, reduction in profitability.

In conducting business, organisations perform some activities for proper execution of business operations. Organisations pay out for stocks, grant credit facilities to customers, make some advance payments (prepayment) to suppliers, lodge some idle funds in their bank accounts and keep some cash vault for emergency payment. These activities constitute current assets of stock, debtors, prepayment, bank and cash. Also, organisations which cannot finance its activities solely with their own fund do borrow by way of collection of stocks on credit with promise to pay when they have enough funds (trade credit), and receive credit facilities from fund surplus units to fill up the funding gap. These activities constitute current liabilities. Hence, working capital is described as an investment of the firm capital in current assets and the use of current liabilities to fund part of investment (Napompech, 2012).

Working capital management is the management of investments or divestment in current assets and increase or decrease in current liabilities. It entails short-term decisions generally relating to the next one year period (Nwude, 2012). It is the management of current asset levels and arrangement of short-term credit to finance current investment. Working capital management
is a vital component of corporate finance because it directly affects the liquidity and profitability of the company. The management of working capital covers all areas of planning and controlling of current assets and current liabilities; thus, it provides enough cash to meet the short-term obligations of a firm. Working capital management involves the determination of optimum level of working capital to keep monitoring and controlling the level of individual component of working capital (Akinsulire, 2011). The amounts invested in working capital are often high in proportion to the total assets employed and so, it is vital that these amounts are used in an efficient and effective way.

The management of working capital is importance to the financial health of business of all sizes. According to Akinlo (2011), working capital constitutes an important source of capital for small and medium scale enterprises as well as high flying firms. Every business requires working capital for its survival. Firms with high amount of working capital are able to meet their short term obligations easily thereby decreasing their default risk and enhancing their borrowing capability. And, increase in borrowing capability is often perceived as indication of decrease in cost of debt (and also in cost of capital). It is possible to state that the efficiency in working capital management affects not just the short term profitability but also long-term liquidity.

A company can be endowed with assets and profitability but short of liquidity, if its assets cannot readily be converted into cash. Thus, the two objectives of profitability and liquidity are important in business organizations. Positive working capital is required to ensure that a firm is able to continue its operations and that it has sufficient funds to satisfy both maturing short-term debt and upcoming operational expenses. The management of working capital involves managing inventories, accounts receivable and payable and cash (Niresh, 2012). Current assets resources are made up of cash, marketable securities, inventories and receivables; while current
liabilities are bank loans creditors, and taxation. The significant of proper management of working capital cannot be over emphasized. This is because of its unique activity. Improper management of working capital could lead the company into liquidation. Therefore, this study aimed at providing further empirical evidence on the impact of working capital management on firm profitability using a panel data of quoted oil and gas companies in Nigeria.

2. LITERATURE REVIEW

Working capital management can be considered as an important determinant of profitability performance of a firm. Many researchers investigated the impact of working capital management on financial performance. Several Research though limited have also been carried out in this important area of corporate finance. Soenen (1993) investigated the relationship between the net trade cycle as a measure of working capital and return on investment in the USA firms. The results indicated a negative relationship between the length of net trade cycle and return on assets. However, this inverse relationship was found different, across industries depending on the type of industry.

Eljelly (2004) examined the relationship between profitability and liquidity, as measured by current ratio and cash gap (cash conversion cycle) on a sample of 929 joint stock companies in Saudi Arabia. Using correlation and regression analysis, he found significant negative relationship between the firm profitability and liquidity level, as measured by current ratio. This relationship is more pronounced for firms with high current ratios and long cash conversion cycles. At the industry level, however, he found that the cash conversion cycle or the cash gap is of more importance as a measure of liquidity than current ratio that affects profitability. The firm size variable was also found to have significant effect on profitability at the industry level.
Falope and Ajilore (2009) investigated the impact of working capital management on corporate profitability for a panel made up of a sample of Nigerian quoted non-financial firms for the period 1996-2005. The findings revealed that there existed a significantly negative relationship between net operating profitability and the average collection period, inventory turnover in days, average payment period and cash conversion cycle. Also, the study found no significant variations in the effects of working capital management between large and small firms.

Shahid (2011) examined the association between working capital management and the profitability of 160 textile firms in Pakistan. He represented working capital management by cash conversion efficiency, days operating cycle, and days of working capital, while return on assets, economic value added, return on equity, and profit margin on sales as proxies for profitability. The results showed that return on assets was significantly and negatively related to average days receivable, positively related to average days in inventory, and significantly and negatively related to average days payable. Also, return on assets had a significant positive correlation with the cash conversion cycle, which suggested that a longer cash conversion cycle is more profitable in the textiles business.

Akinlo (2011) examined the effect of working capital on profitability of firms in Nigeria. The scope of the study covers 66 listed manufacturing firms for the period 1999-2007. The study adopted the dynamic panel general method of moments in analyzing the data. Results of the estimation showed that sales growth, cash conversion cycle, account receivables and inventory period affect firm positively, while leverage and account payable affect firm profitability negatively.
Ahmadi et al. (2012) investigated the relationship between working capital management and profitability of food industry group member on Tehran Stock Exchange. 33 companies were selected for a period of five years from 2006-2011 and the effect of various variables of working capital management including average accounts collection cycle, inventory turnover, medium-term debt payment and the cash conversion cycle on operational net profit of companies. Current ratio, debt ratio and the company size (which has been measured by natural logarithm of sale) was considered as control group (control variable). For data analysis, correlation and regression was used. Their study showed that there is a reverse relationship between the variables of working capital management and profitability. They concluded that increasing collection cycle, debt payment period, inventory turnover and cash conversion cycle leads to decreasing profitability in the companies.

Onwumere et al. (2012) also investigated the impact of working capital policies on profitability of Nigerian firms for the period 2004-2008. Adopting the aggressive investment working capital policies and aggressive financing policies as independent variables and return on assets as dependent variable and controlling for size and leverage, the study revealed that aggressive investment working capital policies of Nigerian firms have a positive and significant impact on profitability while aggressive financing policies have a positive and non-significant impact on profitability. The findings from this study indicated that firms pursuing aggressive investment working capital policy will become risky in the long-run because as profitability increases; the firm grows and the amount of outsiders’ contributions also increases. The result also indicates that as firm grows and outsiders’ contribution increases; the use of aggressive financing working capital policy decreases the profitability of the firm.
Manzoor (2013) empirically examined the relationship working capital management and profitability. The made use of secondary data collected from 28 Iran cements companies for the period of 2004-2009. Data collected were analyzed using the techniques of correlation coefficient and multiple regression analysis. The findings revealed that return on investment was very weak and negatively correlated with the current ratio, and inventory turnover ratio; while return on investment was very weak and positively correlated with liquidity and credit turnover ratios.

All the above studies showed that there is significant relationship between working capital management and firm performance. This present study provided further empirical evidence on the relationship between working capital management and firm performance using firms in the oil and gas industry – an industry which has contributed significantly to economic growth of Nigeria.

3. METHODOLOGY

The study relied on secondary data obtained from five listed oil and gas companies: Oando Plc., Mobil Oil Nigeria Plc., Texaco Plc., Total Nigeria Plc., and Statoil Plc. The sampling technique for this study was purposive because these five firms had up-to-date information and thus, relevant data were obtained from their financial reports. These data were sourced from companies’ annual reports for eleven (11) years – from the year 2003 to 2013. This includes information on components of working capital management and profitability which were collated for the use of this study.

The dependent variable of this study is profitability performance which was measured by return on assets, while the independent variable is the working capital management which was
measured by inventory turnover ratio, cash conversion circle, and liquidity ratio. Return on Assets (ROA) is adopted for this study because it shows how effectively and efficiently a firm utilizes the resources (assets) at its disposal in revenue generation. In other words, it is an indication of an organization’s operating efficiency.

\[
ROA = \frac{\text{Earnings before dividend and taxation}}{\text{Gross fixed assets} + \text{Net current assets}} \times 100 \quad \text{.................................................. (i)}
\]

Inventory turnover ratio (ITR) measures the number of times average inventory is used up in a year. The higher, the better.

\[
ITR = \frac{\text{Annual cost of inventory}}{\text{Average inventory}} \quad \text{.................................................. (ii)}
\]

Liquidity ratio (LR) measures the coverage of current liabilities by current asset less stock. The higher, the better.

\[
LR = \frac{\text{Current assets} - \text{inventory}}{\text{Current liabilities}} \quad \text{.................................................. (iii)}
\]

Cash conversion cycle (CCC) measures the length of time it takes to convert inventory of raw materials through work-in-process, through finished goods through receivables and back to cash. It is the sum of inventory period and receivable period. It measures working capital management efficiency. The shorter the conversion cycle, the more liquid the firm.

\[
CCC = \text{Inventory period} + \text{Receivable period} \quad \text{.................................................. (iv)}
\]

Where:

\[
\text{Inventory period} = \frac{\text{Average inventory}}{\text{Annual cost of inventory}} \times 365 \quad \text{.................................................. (v)}
\]

\[
\text{Receivable period} = \frac{\text{Average account receivable}}{\text{Sales}} \times 365 \quad \text{.................................................. (vi)}
\]

**Model Specification:**

The static model to analyze companies with panel data is as follows:

\[
Y_{it} = \beta X_{it} + \eta_{it} + \lambda_{t} + \epsilon_{it} \quad \text{.................................................. (vii)}
\]
with \( i = 1, 2, \ldots, N \) and \( t = 1, 2, \ldots, T \)

Where:

\( Y_{it} \) = Return on investment (ROI) of firm \( i \) in year \( t \)

\( X_{it} \) = Kx1 vector of explanatory variables

\( \beta \) = Kx1 vector of constants

\( \eta_i \) = individual firm effect assumed constant for firm \( i \) over \( t \)

\( \lambda_t \) = time specific effect assumed constant for given \( t \) over \( i \)

\( \epsilon_{it} \) = time varying disturbance term serially uncorrelated with mean zero and variance 1.

\[
ROA_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 ITR_{it} + \beta_3 LR_{it} + \eta_i + \lambda_t + \epsilon_{it} \]

Apriori expectation: \( \beta_1 < 0, \beta_2 > 0, \beta_3 > 0 \)

### 4. RESULTS AND DISCUSSION

#### 4.1 Descriptive Statistics of the Selected Oil and Gas Companies

Descriptive statistics was presented in Table 1. It showed the number of observations of all variables, their average values and their standard deviation. It also showed the minimum and maximum values which can be attained by these variables. It showed that on average the firms earned about 35% as return on the total assets as represented in gross total assets, it took the firm’s 72 days to convert inventory of raw material through work-in-process, through finished goods, through receivables and back to cash. In terms of liquidity quick ratio, on average, firms could pay their short term liabilities about 9 times out of current assets. It further showed that on average firms used up their average inventory 20 times. The table also revealed 55 as the total firm year observations.
Table 1: Descriptive Statistics of the Measured Variables

<table>
<thead>
<tr>
<th></th>
<th>ROA</th>
<th>CCC</th>
<th>ITR</th>
<th>LR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>35.00060</td>
<td>72.33980</td>
<td>20.01540</td>
<td>8.862400</td>
</tr>
<tr>
<td>Median</td>
<td>33.91500</td>
<td>63.56000</td>
<td>18.26000</td>
<td>1.205000</td>
</tr>
<tr>
<td>Maximum</td>
<td>66.43000</td>
<td>131.7200</td>
<td>95.79000</td>
<td>35.48000</td>
</tr>
<tr>
<td>Minimum</td>
<td>12.67000</td>
<td>10.88000</td>
<td>0.660000</td>
<td>0.410000</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>13.62885</td>
<td>28.76787</td>
<td>14.52446</td>
<td>10.94185</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.370146</td>
<td>0.439378</td>
<td>2.816825</td>
<td>1.044053</td>
</tr>
<tr>
<td>Sum</td>
<td>1750.030</td>
<td>3616.990</td>
<td>1000.770</td>
<td>443.1200</td>
</tr>
<tr>
<td>Observations</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>55</td>
</tr>
</tbody>
</table>

4.2 Stationarity Test for the Variables

Panel unit root test was applied for all variables used in the analysis in order to determine the level of stationarity of the variables and to avoid spurious regression results. The study applied Fisher-type test because it has more advantages than other panel unit root tests. The Fisher type unit root test requires specification of Augmented Dickey-Fuller and Phillip Peron to test whether a variable has unit root. Table 2 showed the results of the Panel unit root test. These tests had been used to test the presence of a unit root in the panel form of data. The panel data were appropriately examined by using the ADF - Fisher Chi-square and PP - Fisher Chi-square tests. These techniques were applied to confirm that whether the series of ROA, CCC, ITR and LR contains a unit root. The study therefore concluded that all the variables under consideration were used in their first difference. This means that the results obtained were not spurious.
Table 2: Panel Unit Root Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF Statistics</th>
<th>ADF P-Value</th>
<th>PP Statistics</th>
<th>PP P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>18.2796</td>
<td>0.0204</td>
<td>41.0572</td>
<td>0.0000</td>
</tr>
<tr>
<td>CCC</td>
<td>17.7184</td>
<td>0.0199</td>
<td>60.6814</td>
<td>0.0000</td>
</tr>
<tr>
<td>ITR</td>
<td>29.7272</td>
<td>0.0009</td>
<td>36.4277</td>
<td>0.0001</td>
</tr>
<tr>
<td>LR</td>
<td>18.3368</td>
<td>0.0495</td>
<td>53.1136</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

4.3 Correlation Analysis

Table 3 provides the Pearson’s correlation for the variables that were used in the model. Pearson’s correlation analysis was used to find the relationship between working management and firm profitability performance. The analysis displayed the correlation values between the firm profitability variable and working capital management variables. It showed that return on asset (ROA) was negatively correlated with cash conversion cycle (CCC) which means the higher the length of time it takes inventory to be converted into cash, the lower the rate of return on investment. This implies that if the firm is able to reduce these time periods, then the firm is efficient in managing working capital. This efficiency will lead to increasing its profitability. Thus, decrease in cash conversion cycle results in increase in firm profitability. Also, ROA was positively correlated with inventory turnover ratio (ITR) and liquidity ratio (LR); this means that any increase in any of these measures will increase profitability performance of the firms. The positive relationship between ROA and ITR and LR indicates that if more current assets are used to finance the total assets it will have a positive impact on ROA. This revealed that, current assets are kept by the oil and gas firms in relation to the total assets putting the firms in conservative position. The results of this analysis are consistent with common findings in
empirical literature. Generally, it can be seen that the results of the correlation analysis indicated that working capital management affects the profitability of the selected oil and gas firms.

<table>
<thead>
<tr>
<th>Table 3: Correlation Matrix Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>ROA</td>
</tr>
<tr>
<td>CCC</td>
</tr>
<tr>
<td>ITR</td>
</tr>
<tr>
<td>LR</td>
</tr>
</tbody>
</table>

4.4 Working Capital Management and Profitability of the Oil and Gas Companies

We present the result from panel data estimation of the effects of measures of working capital management, namely cash conversion cycle (CCC), inventory turnover ratio (ITR) and liquidity ratio (LR) on profitability of the selected oil and gas firms.

Estimating models from panel data requires that we first determine whether there is a correlation between the unobservable heterogeneity ($\eta_i$) of each firm and the explanatory variables of the model. If there is a correlation (fixed effects), an estimation by means of within-group estimator is obtained. Otherwise (random effects) a more efficient estimator can be achieved by estimating the equation by Generalized Least Squares (GLS). The determine whether the effect is fixed or random, Hausman test is employed under the null hypothesis $E(\eta_i/X_{it}) = 0$. If the null hypothesis is rejected, the effect is considered to be fixed and the model is then estimated by OLS. If the null hypothesis is accepted, the effect is random and the model is then estimated by GLS which gives a more efficient estimator of $\beta$. 
The Hausman specification test conducted for the model of this study showed a significant value (at 5% level) and therefore suggested the use of fixed effect. Therefore, to estimate the coefficients in this study, a panel data analysis with fixed effect model was conducted. Table 4 presents the results of the panel (fixed effect model) analysis.

The estimation result indicated that the coefficient of cash conversion cycle had a negative and significant effect on return on assets. The negative coefficient of 0.072120 means that holding other variables in the regression constant, a unit decrease in cash conversion cycle would lead to about 1.0% increase in return on assets. Also, inventory turnover ratio and liquidity ratio were found to have positive effect on return on assets. The positive coefficients of 0.048097 and 5.457726 showed that a unit increase in inventory turnover ratio and liquidity ratio resulted in about 0.4% and 5.5% increase in return on assets respectively. Of the three components of working capital management, liquidity ratio alone was statistically significant to the firms’ profitability performance (t = 0.0391, p < 0.05).

The result of the adjusted coefficient of determination (R^2) showed that working capital management explained a significant proportion (66.43%) of variation in the return on assets of the firms. This implies that there is a strong and positive relationship between working capital management and profitability performance of the firms. Furthermore, the analysis revealed that cash conversion cycle, inventory turnover and liquidity ratio had significant impact on the return on assets of the firms (F = 16.262, p < 0.05). The Durbin-Watson statistics which is approximately 2.0 indicated that the model is not suffering from first order serial autocorrelation. These results are consistent with the findings of Deloof (2003), Eljelly (2004) and Falope and Ajilore (2009) who found a strong relationship between the measures of working capital
management such as inventory turnover in days, average collection period, and cash conversion cycle, and corporate profitability.

Table 4: Panel data Estimates of Impact of Working Capital Management on Profitability

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>35.58529</td>
<td>7.055566</td>
<td>5.043577</td>
<td>0.0000</td>
</tr>
<tr>
<td>CCC</td>
<td>-0.072120</td>
<td>0.077484</td>
<td>-0.930766</td>
<td>0.3567</td>
</tr>
<tr>
<td>ITR</td>
<td>0.048097</td>
<td>0.076839</td>
<td>0.625945</td>
<td>0.5344</td>
</tr>
<tr>
<td>LR</td>
<td>5.457726</td>
<td>2.571459</td>
<td>2.122424</td>
<td>0.0391</td>
</tr>
</tbody>
</table>

| R-squared | Mean dependent var | 2.672638 |
| Adjusted R-squared | S.D. dependent var | 1.374983 |
| S.E. of regression | Sum squared resid | 50.69604 |
| F-statistic | Durbin-Watson stat | 2.025122 |
| Prob(F-statistic) | Akaike info criterion | 7.871223 |

Dependent variable: ROA

5. CONCLUSION

This study provided further empirical evidence about the effects of working capital management on profitability for a panel made up of a sample of five prosperous oil and gas firms in Nigeria for the period 2003-2013. The study found significant positive relationship between firm profitability with liquidity ratio and inventory turnover ratio, and a negative relationship between profitability and cash conversion cycle. Thus, effective conversion of inventory of raw material, through work in progress, finished goods, receivables and finally to cash will have a
positive effect on rate of return on investment of firms, which will further help to achieve its goals and objectives. Furthermore, proper investment in current asset without stock will help to cover its current liabilities which will prevent liquid problem, and hence strengthen firm profitability performance. If firms properly manage their cash, accounts receivable and inventories, it will ultimately boost their profitability. We therefore concluded that effective management of working capital contributes significantly to firm profitability.

**REFERENCE**


