

Impact of Working Capital Management on Performance of Manufacturing Industries in Nigeria

The study analyzed impact of working capital management on firms' performance in Nigeria. Data was sourced from Annual Reports of five listed manufacturing companies in Nigeria from 2000 to 2018. Study made use of unit root tests, error correction mechanism and cointegration tests to conduct its tests and analysis. The data analysis began with the panel unit root test which revealed that data collected had a mixed integration thereby resulting to use of pooled mean group (PMG) approach to data analysis. Prior to PMG estimation, panel cointegration tests based on Pedroni and Kao approaches revealed that a long-run relationship existed between working capital measures and firm performance. The error correction mechanism (ECM) revealed a rapid adjustment from short-run disequilibrium to long-run equilibrium of the model. Specifically, the long-run equation showed that inventory conversion period, debt collection period and creditor's payment period had negative long-run impact on return on assets of selected companies with only debt collection period being significant. On the other hand, cash collection period and sales revenue had positive and significant impact on return on assets in the long-run. These clearly confirmed that debt collection period, cash conversion period and sales revenue were the most significant working capital management variables in the regression model. Based these findings, policies aimed at enhancing working capital management and performance of listed firms were recommended.

Introduction

Background to the Study

Financial management decision of a firm has four aspects, which include investment decision, financing decision, dividend decision and liquidity decision. The working capital management is considered to be a vital issue in liquidity and short-term investment decisions of the firm. It has an effect on liquidity as well as on profitability of the firm. The value of the firm is being created by optimal working capital management. The term working capital refers to the quantum of fund required to maintain day-to-day expenditure on operational activities of a business enterprise. It is actually required to run the wheels of the business enterprise. Working capital management objective is to maximize the profits, which results into reducing the risk of not being able to satisfy the maturing short-term debts. The efficacy of working capital management depends on the balance between liquidity and profitability. A firm's high liquidity risk results in high profitability. The issue here is that in managing working capital, a firm must take into consideration all the items in both debit and credit sides of an account and try to balance the risk and return (Pinku and Paroma, 2018; Nireesh, 2012).

Working Capital Management is a managerial accounting strategy focusing on maintaining efficient levels of a firm's current assets and current liabilities. It deals with the administration of a firm's current assets and current liabilities (Harris, 2005). Working capital management ensures that a company has sufficient cashflows in order to meet its short-term debt obligations and operating expenses (Mekonnen, 2011). Working capital management is a very important component of corporate finance because it directly affects liquidity and profitability of a company (Anand and Gupta, 2013). Working Capital Management is important for many reasons. The current assets of a typical manufacturing firm accounts for over half of its total assets. Thus, working capital represents a significant investment in the manufacturing firms. Excessive levels of current assets can easily result in a firm's realization of a substandard return on investment.

Acceptance of effective and efficient management understanding in terms of management of working capital would provide a positive contribution to the performance of a company. An effective management of working capital will benefit not only the enterprise but also to the country's economy. In this context, manufacturing firms, considered as the backbone of dynamic and immersive elements of economy are very important since they contribute to the development of a country's economy through their flexible structures and harmonizing to changing conditions (Izadi, Niya and Taaki, 2010). This importance has been perceived even better in developed or developing countries especially in a country like Nigeria which has always faced economic crisis, from time to time. Azarbayjani, Soroush and Yarian, (2011), claimed that an effective working capital would increase the value of a firm. Similarly, Pinku and Paroma (2018), pointed out in their study that a strong relationship exists between management of working capital and performance of a company. In respect of manufacturing firms, Anand and Gupta (2002), emphasized in their study that the importance of management of working capital in terms of financial performance in industries should be increased.

On the other hand, Kirwa (2012), discovered that industries that adopted debt and equity principles to make working capital decisions usually result in low capacity utilization and inability to provide sufficient use. However, too few current assets may occasion difficulties in maintaining smooth firm operations (Lu, 2013). Management of working capital, which aims at maintaining an optimal balance between each of the working capital components, that is, cash, receivables, inventory and payables, is a fundamental part of the overall corporate strategy to create value and it is an important source of competitive advantage in businesses (Deloof, 2003). In practice, it has become one of the most important issues in organizations with many financial executives struggling to identify the basic working capital drivers and the appropriate level of working capital to hold so as to minimize risk, effectively prepare for uncertainty and improve the overall performance of their businesses (Gill, Bigerand and Mathur, 2010). The crucial part in managing working capital is maintaining sufficient liquidity for the day-to-day business operations to ensure firm's smooth running and meeting its

obligations (Ganesan, 2007). A well calculated and employed working capital management is anticipated to add positively to the firm's performance (Padachi, 2006). Holding of excess amounts of working capital could cause a decline in the profitability of a business, whereas less of working capital could result to inability to cover a firm's short-term expenses and might be a sign of impending insolvency (Lu, 2013).

Working Capital Management involves managing the firm's inventory, receivables and payables in order to achieve a balance between risk and returns and thereby contribute positively to the creation of a firm's value. Excessive investment in inventory and receivables reduces firm profits, whereas too little investment increases the risk of not being able to meet commitments as and when they become due. Therefore, the importance of maintaining an appropriate level of working capital and its contribution to business survival is a concept that should be understood by every company (Harris, 2005). Similar view was expressed by Mekonnen (2011), who noted that efficient working capital management involves planning and controlling current assets and current liabilities in a manner that eliminates the risk of inability to meet due short-term obligations. This study therefore, is undertaken to examine impact of working capital management on the performance of manufacturing industries in Nigeria. By the time the study is completed the researchers would be in a better way to ascertain the true position of affairs.

Statement of the Problem

The existence and survival of a business depend largely on resources to keep it going and ensure that such resources are maximally utilized to enhance its profitability and overall performance. Working Capital Management and its impact on firms' performance have been carried out in previous studies like (Niresh, 2012; Nyarige and Olweny, 2014; Mutungi, 2010); Mwangi, 2013; Onodje, 2014). It was discovered that not all working capital decision strategies could be said to completely rely on the cardinal principles of finance. Out of the three main strategies of working capital decisions which are hedging, conservative and aggressive method, the hedging method could be said to be the ideal method because it entails moderate severe risk and high profitability level. However, aggressive and conservative methods are extreme strategies because they involve high risk and high profitability, while the latter involves low risk and therefore low profitability. Most of these past studies used ordinary least squares (OLS) to investigate relationship between working capital strategies and performance of firms. They found significant differences between them. This, however, makes the managers not to effectively manage the various mix of working capital components which are available to them, and as such, the organization may either be overcapitalized or undercapitalized or worst still, liquidate.

There has been an increasing number of empirical studies that investigated the linkages between working capital management and corporate performance in recent years (Rafiu and John, 2014; Wamugo, Muathe and George, 2014;

Lu, 2013; Waithaka, 2012). Most of these studies focused on large firms and did not consider the fact that the required amount of working capital varies across industries as well as firms depending on the type of business, scale of operation, production cycle, credit policy, availability of raw materials, etc. Also, it is regrettable to note that amidst the numerous studies in this area, many companies had failed, more especially manufacturing companies in Nigeria in which application of working capital is more pronounced (Anyafu, 2002). Additionally, firms with high rate of return are crashing due to inadequacy of working capital. Many factories had been either temporarily or completely shut down because they could not meet their financial obligations as and when due because they were not liquid. Also, most Nigerian workers have been forcefully thrown into unemployment due to poor attention given to the management of working capital (Anand and Gupta, 2002).

These reported inadequacies among financial managers which are still practised today in many organizations in the form of bad debts, inventory costs amongst other things, adversely affect operation performance (Egbide and Enyi, 2008). Also, the fact that an organization makes profits is not necessarily an indication of effective management of its working capital because a company could be endowed with assets and profitability but run short of liquidity if its assets cannot readily be converted into cash. As such, there will be shortage of cash available for the firm's utilization as at when due. Such an organization may run into debts that could affect its performance in the long run because the smooth running of operations of the organization could come to a sudden halt and it would not be able to finance its obligations as at when due (Eljelly, 2004). Some managers neglect organization's operating cycle thereby having longer debtors' collection period and shorter creditors' payment period, an aspect of bad working capital management. The present study would look into these inadequacies with a view to ascertain true effect of working capital management on the performance of selected quoted manufacturing firms in Nigeria (Guinness Nig. Plc., Unilever Plc., Nestle Nig. Plc., 7up bottling company, May & Baker)

Objectives of the Study

The broad objective of this study is to examine impact of working capital management on performance of manufacturing companies in Nigeria. The specific objectives are to:

1. Determine impact of inventory conversion period on return on assets (ROA) of listed manufacturing companies in Nigeria.
2. Ascertain impact of debt collection period on return on assets (ROA) of listed manufacturing companies in Nigeria.
3. Examine impact of creditors' payment period on return on assets (ROA) of listed manufacturing companies in Nigeria.
4. Investigate impact of cash conversion period on return on assets of listed manufacturing companies in Nigeria.

5. Analyze impact of sales revenue on return on assets of listed manufacturing companies in Nigeria.

Research Questions

The study would proffer answers to the following questions:

1. In what way does inventory conversion period impact on return on assets of listed firms in Nigeria?
2. To what extent does debt collection period impact on return on assets of listed firms in Nigeria?
3. How does creditors' payment period impact on return on assets of listed firms in Nigeria?
4. To what degree does cash conversion period impact on return on assets of listed firms in Nigeria?
5. In what way does sales revenue impact on return on assets of listed manufacturing companies in Nigeria?

Hypotheses

The following hypotheses have been formulated and tested:

- Ho₁: Inventory conversion period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.
- Ho₂: Debt collection period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.
- Ho₃: Creditors' payment period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.
- Ho₄: Cash conversion period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.
- Ho₅: Sales revenue does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.

Review of Literature

Overview of working Capital

According to Uremadu, Egbide & Enyi, (2012), there are two concepts to working capital: gross and net; gross working capital referred to as the firm's investment in current assets. Current assets are the assets which can be converted into cash within an accounting year (known as operating cycle) and they include cash, short-term securities, debtors (accounts receivables or book debts), bills receivable and stock. Secondly, net working capital refers to the difference between current assets and current liabilities. Current liabilities are

those claims of outsiders which are expected to mature for payment within an accounting year and include creditors (accounts payable), bills payable, and outstanding expenses. A positive net working capital will arise when current assets exceed current liabilities while a negative net working capital occurs when current liabilities are in excess of current assets (Pandey, 2000).

The two concepts of working capital (i.e. gross and net) are not exclusive; rather they have equal significance from the management viewpoint (Uremadu, Egbide and Enyi, 2012). The gross working capital focuses attention on two aspects of current assets management. (i) How to optimize investment in current assets? (ii) How should current assets be financed? On point (i) above, the study conceptualizes that the consideration of the level of investment in current assets should avoid two danger points; excessive and inadequate investment in current assets. Investment in current assets should be just adequate, not more, not less, to the needs of the business firm. Excessive investment in current assets should be avoided because it impairs the firm's profitability, as idle investment earns nothing (Uremadu, Egbide and Enyi, 2012). Again, inadequate amount of working capital can threaten solvency of the firm because of its inability to meet its current obligations. It should be realized that the working capital needs of the firm may be fluctuating with changing business activity. This may cause excess or shortage of working capital frequently. The management should be prompted to initiate an action and correct imbalances (Pandey, 2000).

Another aspect of the gross working capital points to the need of arranging funds to finance current assets. Whenever a need for working capital funds arises due to the increasing level of business activity or for any other reason, financing arrangement should be made quickly. Similarly, if suddenly, some surplus funds arise, they should not be allowed to remain idle, but should be invested in securities. Thus, the financial manager should have knowledge of the sources of working capital funds as well as investment avenues where idle funds may be temporarily invested. Net working capital is a qualitative concept and as such it indicates the liquidity position of the firm and suggests the extent to which working capital needs could be financed by permanent sources of funds. Current assets should be sufficiently in excess of current liabilities to constitute a margin or buffer for maturing obligations within the ordinary operating cycle of a business. In order to protect their interest, short-term creditors would always like a company to maintain current assets at a higher level than current liabilities and in most cases, twice the level of current liabilities (Pandey, 2000). However, the quality of current assets should be considered in determining the level of current assets vis-à-vis current liabilities. A weak liquidity position poses a threat to the solvency of the company and makes it unsafe and unsound. A negative working capital means a negative liquidity, and may prove harmful for the company's reputation.

Net working capital concept also covers the question of judicious mix of long-term and short-term funds for financing current assets (Pandey, 2000). For every firm, there is a minimum amount of net working capital which is permanent. Therefore, a portion of the working capital should be financed with

the permanent sources of funds such as equity share capital, debentures, long-term debt, preference share capital or retained earnings. Management must, therefore decide the extent to which current assets should be financed with equity capital and or debt capital (Uremadu, 2009). The data and problems of each company should be analyzed to determine the amounts of working capital. There is no specific rule as to how current assets should be financed. It is also not feasible in practice to finance current assets by short-term sources only. Keeping in view the constraints of the individual firm, a judicious mix of long and short-term finances should be invested in current assets. Since current assets involve cost of funds they should be put to productive use (Pandey, 2000).

Furthermore, Egbide and Enyi (2008), enjoined that top management must manage the working capital in such a way as to take care of the fluctuations in the current assets. This, according to them, would help the management make decisions with respect to the level of current assets considered optimal, the firm's credit policies and the financing of its current assets given cognizance to its associated costs and benefits for the organization. Reasoning along similar vein, Uremadu (2004), posited that the importance of working capital can be seen from the time devoted by the financial manager to the day-to-day working capital decisions, the proportion of current assets in the total assets of the firm (more than half) and the significant and direct relationship between current assets and sales growth. Consistent with this view-point is Van-Horne and Machowitz (2005), who added that effect of working capital decisions on the company's risk, return and share price is of more fundamental significance to working capital management among corporate firms at a global dispensation than it has been before now. At this juncture, empirical literature will mainly centre on the relationships between working capital components (inventory, debtors, creditors, and cash) and profitability, the effect of cash conversion cycle on profitability as well as issues that border on trade-off between liquidity and profitability.

Theoretical Framework

Contingency Theory

Developed by Saxberg (1979), contingency theory of working capital management stated that the effectiveness of working capital is highest where the structure fits the contingencies, hence only those organizations that align their working capital with the current environment achieve maximum output. The theory therefore advocates that in determining the level/approach of working capital management to approach, firms must put into consideration the strategically significant external variables such as include economic conditions, demographic trends, socio-cultural trends political/legal factors and industry structure. The theory further notes that there is no level of working capital and is said to be constantly optimal in any particular industry. Rather, given that external factors may change rapidly, managers must constantly adopt their organizations' levels and approaches of working capital management to the

new situation to ensure effectiveness. The Contingency Theory therefore implicitly treats organizations as loosely coupled aggregates whose separate working capital components may be adjusted or fine-tuned.

Risk and Return Theory

Zariyawati, *et al.*, (2009), a theory of risk and return stated that investment with a higher risk may create a higher return, thus a firm with a high liquidity in working capital will have a low risk of failing to meet its obligations, and low profitability at the same time. That is, the greater the amount of net working capital (NWC), the less risk-prone the firm is and the greater the NWC, the more liquid is the firm therefore, the less likely it is to become technically insolvent. Conversely, the lower of NWC and liquidity are associated with increasing levels of risk. The relationship between liquidity, NWC and risk is such that if either NWC or liquidity increases, the firm's risk decreases.

Asset Profitability Theory

Asset profitability theory by Sathamoorthi (2002), stated that increase in current asset to total assets ratio has a negative effect on firms' profitability, while on the other hand, increase in current liabilities to total liabilities ratios has a positive effect on profitability of firms. This theory notes that decrease in current asset to total assets ratio as well as increase in the ratio of current liabilities to total liabilities ratios, when considered independently, lead to an increased profitability coupled with a corresponding increase in risk. Increase in the ratio of current assets to total assets decline in profitability because it is assumed that (i) current assets are less profitable than fixed assets; and (ii) short-term funds are less expensive than long-term funds. Decrease in the ratio of current assets to total assets will result in an increase in profitability as well as risk. The increase in profitability will primarily be due to the corresponding increase in fixed assets which are likely to generate higher returns because corresponding increase in fixed assets which are likely to generate higher returns (Sathamoorthi, 2002).

On the other hand, Sathamoorthi (2002), pointed out that effect of an increase in the ratio of current liabilities to total assets would be that profitability will increase. The reason for the increased profitability lies in the fact that current liabilities, which are a short-term source of finance, will increase, whereas the long-term sources of finance will be reduce. As short-term sources of finance are less expensive than long-run sources, increase in the ratio will mean substituting less expensive sources for more expensive sources of financing. There will therefore be a decline in cost and a corresponding rise in profitability.

Conceptual Framework

The success of a firm is a function of its ability to generate cash receipts in excess of cash disbursements. But poor financial management and of course

inadequate plan for cash requirement accelerates problem in organizations. Suffice to say that increasing profit at the cost of liquidity of the firm brings a serious problem, hence serious plan must be in place for effective attainment of the organizational objectives, that is, why working capital has become an imperative issue especially in organization where financial managers find it difficult to identify the major drivers of working capital. Any wonder, Lamberson (1990), opined that the central objective of working capital is to ensure that the optimal level of cash and marketable securities or other non-financial inventories and account receivables are determined with a view to maximizing the total value of the firm.

Empirical Framework

In a recent study, Osuma and Ikpefan (2018), examined how profitability of banks could be enhanced through working capital management. To empirically carry out the analysis, panel data which consisted of ten (10) commercial banks in Nigeria for seven years (2010–2016) employing panel fixed effect, panel random effect and the pooled OLS for the two models, which were used as proxies for bank profitability, which includes return on asset (ROA) and return on equity (ROE) to examine the best measure for bank profitability, with the indicators of working capital; net interest income, current ratio, profit after tax, and monetary policy rate. Results of the study showed that working capital management has a significant effect on the profitability of the selected banks and that return on asset is a better measure for bank profitability.

Similarly, Pinku and Paroma (2018), analysed impact of working capital management on profitability of the firms of Indian steel industry. The study had taken into consideration four independent variables, that is, current ratio, quick ratio, debtors' turnover ratio and finished goods turnover ratio which acted as indicators of working capital used in the industry. Return on total assets represented profitability of the industry and acted as a dependent variable to develop an empirical model in order to establish relationship between working capital management and profitability of the steel industry in India by using panel data regression. The period of study was 17 years, that is, 2000–2016. The result of the study indicated that impact of working capital management on profitability of the firms of Indian steel industry has been significant.

Also, Eya (2016), examined impact of working capital management on firm performance using Nestle Food Nigeria Plc. as a case study. The study was anchored on Behavioural Finance Theory, Economic Order Quantity (EOQ) Model and Theory of Capital Movement. Secondary data was used for the study and it was obtained from the financial statement of Nestle Nigeria Plc. for the period of 2004-2013. The study made use of Ordinary Least Squares (OLS) regression after the data was subjected to unit root test and found to be stationary at levels and are integrated of order zero $I(0)$. The findings revealed that a positive relationship existed between Current Ratio

(CUR), Quick Ratio (QUR) and Return on Asset (ROA) and the relationship is statistically significant ($p < 0.05$) and in line with a priori expectation. The coefficient of determination (R^2) for the study is 85.23%. This indicated that 85.23% of the variations in the model could be explained by the explanatory variables of the model. The result showed that the management of working capital is important to business organization performance.

Similarly, Jeyan (2016), examined relationship between working capital management and firms' profitability. Working capital management was measured with cash conversion cycle and liquidity level of working capital was indicated by current ratio and quick ratio. The control variables like; current assets to total assets, current liabilities to total assets, gearing ratio and firm size (measured in terms of natural logarithm of sales) were used for measuring working capital management. The profitability was determined in terms of return on total assets. The empirical relationship of the variables in this study was found with the panel data analysis of 20 listed companies in Sri Lanka: Evidence from standard and poor's index companies for a period from 2011 to 2015. Descriptive Statistics, Pearson's Correlation, Regression Analysis were used for analysing the data. The results of this study revealed that, cash conversion cycle as a component of working capital management has a significant negative effect on profitability of listed companies in Sri Lanka.

In another study, Iqbal, Ahmad & Riaz (2014), studied relationship between working capital management and profitability in Pakistan. A database was built from a selection of approximately 50 financial-reports that were made public by publicly traded companies of Pakistan between January 1, 2009 and December 31, 2009. Secondary data was used for analysis of working capital on profitability using descriptive, ANOVA and correlation analysis, the result revealed a significant negative relationship between net operating profitability and the average collection period, inventory turnover in days, average payment period and cash conversion cycle for a sample of Pakistani firms listed on Karachi stock exchange.

Also, Akoto, Vitor & Angmar (2013), analyzed relationship between working capital management practice and profitability of listed manufacturing firms in Ghana. The study used data collected from annual report of all the 13 listed manufacturing firms in Ghana covering the period from 2005-2009. Using panel data methodology and regression analysis, the study found a significant negative relationship between profitability and account receivable days. However, the firm's cash conversion cycle, current asset ratio, size and current asset turnover positively and significantly influence profitability.

Makori & Jagongo (2013), analyzed effect of working capital management on firm's profitability in Kenya. Observation of 5 manufacturing firms listed in Nairobi Securities Exchange for the period of 2003 to 2012. Pearson's correlation and ordinary least square regression models were used to establish relationship between working capital management and firms' profitability. The study found negative relationship between profitability and number of days accounts receivable and cash conversion cycle, but a positive relationship between profitability and number of inventory and number of days payable.

In another study, Ani, Okwo and Ugwunta (2012), studied working capital management as measured by cash conversion cycle (CCC) and how the individual components of the CCC influence profitability of the world leading Beer Brewery Firms for twelve years period (2000-2011). Multiple regression equation was applied to a cross sectional time series data of 5 firms after ensuring that the data were stationary and co- integrated. The outcome clearly pointed that working capital management represented by the cash conversion cycle, sales growth and lesser debtors' collection period impacted on these beer brewery firms' profitability.

Finally, Melita, Elfani and Petros (2010), investigated effect of working capital management on firm's financial performance in an emerging market. They hypothesized that working capital management leads to improved profitability. Data set consisted of firms listed in the Cyprus Stock Exchange for the period 1998-2007. Using multivariate regression analysis, results supported their hypothesis. Specifically, results indicated that the cash conversion cycle and all its major components; namely, days in inventory, day's sales outstanding and creditors' payment period – were associated with the firm's profitability.

Research Methodology

Research Design

The research design used in this study was *ex-post-facto* research design. This is because of the adoption of secondary sources of data collection. The design of this work was geared towards facilitating the attainment of the broad objectives of this study which is impact of working capital management on the performance of manufacturing industries in Nigeria.

Sources of Data

Based on the aims of the present research, a review of the literature supported by empirical studies was conducted. A literature review was performed to identify the performance assessment method and practices of some sampled industries making their financial positions attractive to the outside world. The literature reviewed comprised articles published, doctoral theses and industry frameworks, guidelines and regulations. The secondary data were collected from the annual financial reports and statement of accounts (various) of the five (5) manufacturing industries sampled within the period of the study.

Population of the Study

The population is made-up of forty (40) manufacturing companies listed on the Nigerian stock exchange during the period of study (NSE, 2018). The reason

for the choice of this market is primarily due to the fact that it is the hub of economic activities in Nigeria.

Sample Size

Sample size is the fraction from the entire population which is used to represent it. Based on this definition, the sample size of this study constituted five (5) manufacturing industries which are quoted in the Nigeria stock exchange. The manufacturing companies include: Guinness Nig. Plc, Unilever Plc, Nestle Nig. Plc, 7up Bottling Company and May and Baker plc.

The study used judgmental sampling techniques to select the samples based on the following criteria:

- 1) Companies must remain listed on the Nigerian Stock Exchange (NSE) during the 2000 – 2018 periods.
- 2) Companies must have complete financial statements for the period under review.
- 3) Companies must be operational within the period under investigation.

Model Specification

This study adopted a quantitative research design. This was because quantitative research design is appropriate where the study seeks to explain phenomena by collecting numerical data that is analyzed using statistically based methods (Uremadu, Egbide & Enyi, 2012). The study used secondary data. The secondary data was obtained from the financial reports of the listed manufacturing firms in Nigeria from the individual firms' databases spanning (2000-2018). The study period was to enable the researcher to gather sufficient data on the study variables thereby being able to establish trend in the manufacturing firms' working capital components and financial performance. The study would also adopt a panel data approach in data collection and analysis.

Data collected was edited, coded and classified into different components to facilitate a better and efficient analysis. For the purpose of this study, working capital management was analyzed using its various components namely; current ratios, debt ratios, and creditors payment period while financial performance was analyzed using Return on asset (ROA). In analyzing the data, the study used the modified version of econometric model as adopted from the works of Uremadu, Egbide & Enyi (2012). The model adopted for this study is both mathematically and econometrically stated below. The multivariate specification of this probabilistic model will assume the form of:

$$ROA = \beta_0 + \sum_{i=1}^n \beta X_{it} + e \quad \text{eqn. (3.1)}$$

Where:

ROA = the measure of profitability which is return on assets employed;
 β_0 = the regression constant (or intercept of the equation);
 β_i = the change coefficient for X_{it} variables;
 X_{it} = the different independent variables for profitability or liquidity of the corporate firms i and t .

The general least squares equation (1) above was restated with the specified variables thus below;

$$ROA = f(ICP, DCP, CPP, CCP, M2, CRR) \quad \text{eqn. (3.2)}$$

The final equation to be estimated from equation 2 is:

$$ROA = b_0 + b_1 ICP - b_2 DCP + b_3 CPP + b_4 CCP + b_5 \log(M2) + b_6 CRR + e \quad \text{eqn. (3.3)}$$

Where,

ROA = Operating profit before interest and tax divided by total assets.

Mathematically expressed as:

$$ROA = \frac{\text{Profit before interest and tax}}{\text{Total assets}} \quad \text{eqn. (3.4)}$$

ICP = This is inventory conversion period and the data used in deriving this were from closing stock, opening stock and cost of sales per annum.

Mathematically expressed as:

$$ICP = \frac{\text{Average inventories}}{\text{cost of sales}} \times 365 \text{ days} \quad \text{eqn. (3.5)}$$

$$DCP = \frac{\text{Average Debtors}}{\text{credit sales per annum}} \times 365 \text{ days} \quad \text{eqn. (3.6)}$$

DCP = debtors collection period

The data used to arrive at the average collection period (ACP) were the opening debtors, the closing debtors and the annual sales figures.

CPP = creditors payment period, mathematically expressed as:

$$CPP = \frac{\text{Average debtors}}{\text{Creditors purchase per annum}} \times 365 \text{ days} \quad \text{eqn. (3.7)}$$

CCP = is cash conversion period. It is a composite index derived from the aggregation of ICP,

DCP and CPP. CCP is invariably a vital index and it is used to proxy working capital management in this study. Mathematically,

$$CCP = ICP + DCP - CPP$$

M2 = Money supply

CRR = Cash reserve ratio

e = Error terms

Classification and Description of Variables

Dependent Variable

i. ROA

This is the dependent variable of the study, to be represented as Return on assets. This return on assets is known as the operating profit before the firms' interest and taxes/charges. This explains further that the return on assets has to be determined before bringing in the interest accrued to the firms as well as the taxes which the firms are to be paid. Once the value has been determined, divide the value obtained by the total value of the assets owed by the firms under review. This is what gives the return on assets of each firm to be used in this study.

Mathematically expressed as:

$$ROA = \frac{\text{Profit before interest and tax}}{\text{Total assets}} \quad \text{eqn. (3.8)}$$

Independent Variables

1. ICP

The ICP, is inventory conversion period and the data to be used in deriving this will be from closing stock, opening stock and cost of sales per annum. This explains, the monetary value of closing stock, opening stock and cost of sales per annum from each of the firms to be used in this study. This can be obtained using the mathematically expression as:

$$ICP = \frac{\text{Average inventories}}{\text{cost of sales}} \times 365 \text{ days} \quad \text{eqn. (3.9)}$$

2. DCP

The DCP is debtor's collection period. This is time used to obtain the various debts of the firms which was also a component of the independent variable. It can be mathematically expressed as;

$$DCP = \frac{\text{Average Debtors}}{\text{credit sales per annum}} \times 365 \text{ days} \quad \text{eqn. (3.10)}$$

The data used to arrive at the average collection period (ACP) were the opening debtors, the closing debtors and the annual sales figures.

3. CPP

This stands as the creditors payment period as agreed by the firms and their lenders. To obtain the value to be used for this study for the period under review, this formula will be employed,

$$CPP = \frac{\text{Average debtors}}{\text{Creditors purchase per annum}} \times 365 \text{ days} \quad \text{eqn. (3.11)}$$

4. CCP

The CCP is known as the cash conversion period. It is a composite index derived or obtained from the aggregation of ICP, DCP and CPP. The cash conversion period (CCP) is invariably a vital index and it is used as a component of the independent variable of this study. This is mathematically expressed as;

$$CCP = ICP + DCP - CPP \quad \text{eqn. (3.12)}$$

Presentation of Data, Analysis and Discussions

Presentation of Data

The data used for the analysis was presented in Table 1 below:

Table 1. Panel Data Used for the Study

FI R M	Y E A R	Return on assets (ROA) %	Inventory conversion period (ICP) No. of days	Debtors conversion period (DCP) No. of days	Creditors payment period (CPP) No. of days	Cash conversion period (CCP) No. of days	Total sales revenue (SALES) ₦'million	Money supply (M2) ₦'billion	Cash reserve ratio (CRR) %
GUINNESS NIG. PLC.	2000	7.50	119.21	44.30	68.10	25.67	7925.66	878.46	10.80
	2001	5.50	99.43	10.79	40.28	33.42	4310.46	1269.32	10.60
	2002	8.90	87.91	41.46	52.81	36.88	3386.77	1505.96	10.00
	2003	5.60	102.01	15.90	26.31	40.37	4003.75	1952.92	8.60
	2004	5.10	83.44	29.08	66.93	39.01	4109.65	2131.82	9.70
	2005	9.20	79.02	19.20	42.08	36.69	8365.69	2637.91	4.20
	2006	5.27	80.11	36.86	54.34	29.17	7596.17	3797.91	2.80
	2007	4.99	78.65	57.37	10.15	32.77	1295.18	5127.40	3.00
	2008	3.11	66.34	63.73	78.51	30.95	1002.95	8008.20	1.30
	2009	3.61	79.17	46.12	58.76	33.91	4480.52	9411.11	1.00
	2010	2.62	88.76	39.02	42.36	40.22	7464.73	11034.94	8.00
	2011	1.91	75.65	40.50	36.79	35.91	6549.60	12172.49	12.00

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UNILEVER NIG. PLC.	2012	2.01	100.56	44.87	41.18	27.32	5789.20	13893.22	12.00
	2013	1.95	98.29	28.97	53.04	37.53	5207.53	15154.64	20.00
	2014	0.83	84.57	31.81	33.26	36.67	1016.67	16238.52	20.00
	2015	4.71	77.81	43.74	28.17	33.95	3813.95	18525.22	22.50
	2016	0.28	72.65	17.55	48.32	32.19	1022.19	21624.63	22.50
	2017	5.69	89.21	20.45	41.24	36.73	1066.73	22363.43	22.50
	2018	11.10	111.34	23.86	37.08	1948.10	1948.10	25079.72	22.50
	2000	8.70	90.73	10.79	54.12	31.23	3113.23	878.46	10.80
	2001	9.23	76.09	18.12	53.36	39.68	3089.68	1269.32	10.60
	2002	7.30	89.34	32.60	40.76	33.54	1883.54	1505.96	10.00
	2003	6.34	112.31	55.38	60.86	31.99	2431.99	1952.92	8.60
	2004	5.64	88.56	15.45	49.21	39.56	3192.56	2131.82	9.70
	2005	11.90	56.03	28.97	58.58	37.23	3796.23	2637.91	4.20
	2006	9.20	63.12	16.47	33.79	32.35	6372.35	3797.91	2.80
	2007	10.12	51.27	38.62	40.47	36.26	5752.26	5127.40	3.00
	2008	5.70	69.34	55.10	31.44	30.88	6406.88	8008.20	1.30
	2009	11.20	76.22	63.91	60.35	33.18	3686.18	9411.11	1.00
	2010	7.20	56.84	23.46	51.95	38.93	9758.93	11034.94	8.00
NESTLE NIG. PLC	2011	6.30	119.00	21.18	42.77	35.11	13445.11	12172.49	12.00
	2012	7.60	121.00	25.09	41.66	31.87	17845.87	13893.22	12.00
	2013	16.70	101.23	27.33	39.41	34.17	1434.17	15154.64	20.00
	2014	9.30	171.36	24.08	35.63	28.04	19280.04	16238.52	20.00
	2015	9.10	192.78	28.44	29.13	32.05	21532.05	18525.22	22.50
	2016	11.60	160.65	26.93	31.20	33.11	11193.11	21624.63	22.50
	2017	8.90	96.39	26.33	27.57	35.15	32725.15	22363.43	22.50
	2018	5.40	53.55	23.47	42.55	39.69	14159.69	25079.72	22.50
	2000	1.76	182.07	18.59	10.50	24.76	8324.76	878.46	10.80
	2001	3.21	103.49	41.86	54.00	34.93	5834.93	1269.32	10.60
	2002	2.91	139.23	37.94	84.60	30.69	14160.69	1505.96	10.00
	2003	3.11	182.07	30.96	38.55	25.76	8325.76	1952.92	8.60
	2004	8.76	149.94	24.05	67.75	34.50	2634.50	2131.82	9.70
	2005	10.96	128.52	11.17	12.10	31.04	1991.04	2637.91	4.20
	2006	6.14	53.55	13.63	42.60	29.25	2984.25	3797.91	2.80
	2007	4.29	130.90	49.50	48.13	26.04	4046.04	5127.40	3.00
	2008	12.87	91.27	28.24	82.70	30.55	4930.55	8008.20	1.30
	2009	8.81	139.15	34.63	40.40	33.36	5683.36	9411.11	1.00
	2010	1.96	173.22	23.41	52.46	32.53	3532.53	11034.94	8.00
	2011	3.77	161.80	14.92	93.85	29.29	2719.29	12172.49	12.00
	2012	2.39	143.21	28.25	54.31	26.36	2260.36	13893.22	12.00
	2013	1.84	115.35	50.18	48.12	25.35	6875.35	15154.64	20.00
	2014	4.81	148.81	62.52	41.71	30.37	3770.37	16238.52	20.00

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7UP BOTTLING PLC.	2015	3.61	136.61	27.01	39.50	34.88	7874.88	18525.22	22.50
	2016	1.03	139.38	44.11	68.35	39.46	3938.46	21624.63	22.50
	2017	2.59	176.74	46.18	27.75	40.03	4002.03	22363.43	22.50
	2018	1.84	195.31	21.11	47.73	31.12	1091.20	25079.72	22.50
	2000	6.21	126.11	11.42	61.75	38.67	1268.67	878.46	10.80
	2001	5.13	138.71	16.48	49.54	41.66	1121.66	1269.32	10.60
	2002	7.06	129.42	36.80	35.19	51.24	561.24	1505.96	10.00
	2003	9.99	149.88	51.73	37.46	43.09	733.09	1952.92	8.60
	2004	5.15	151.18	21.02	41.01	53.01	5383.01	2131.82	9.70
	2005	4.05	155.52	13.67	44.35	43.86	6303.86	2637.91	4.20
	2006	3.64	106.46	16.69	29.95	55.12	5595.12	3797.91	2.80
	2007	8.85	88.40	5.84	61.47	45.74	2855.74	5127.40	3.00
	2008	7.74	117.51	16.08	29.53	65.05	2685.05	8008.20	1.30
	2009	10.20	108.95	26.33	38.70	53.17	5083.17	9411.11	1.00
	2010	6.31	133.94	18.29	41.90	55.59	10505.59	11034.94	8.00
	2011	4.31	185.00	22.15	44.80	58.01	15928.01	12172.49	12.00
	2012	3.69	157.37	5.79	37.67	50.43	21350.43	13893.22	12.00
	2013	1.53	198.90	10.22	41.12	62.90	17032.90	15154.64	20.00
MAY & BAKER PLC.	2014	9.75	181.78	37.49	15.16	51.20	15172.20	16238.52	20.00
	2015	5.29	121.88	28.97	10.80	49.80	21499.80	18525.22	22.50
	2016	3.95	211.28	18.74	36.76	44.24	14424.00	21624.63	22.50
	2017	5.13	135.64	16.47	21.61	53.90	24133.90	22363.43	22.50
	2018	5.03	216.92	15.90	19.86	6675.00	30675.00	25079.72	22.50
	2000	5.12	218.46	14.88	18.12	42.3	42876.30	878.46	10.80
	2001	8.70	111.28	19.14	16.38	36.80	34365.80	1269.32	10.60
	2002	9.23	149.82	27.95	14.64	43.50	20293.50	1505.96	10.00
	2003	7.30	171.44	16.53	12.90	47.60	6347.60	1952.92	8.60
	2004	6.34	136.66	26.41	23.50	35.80	6835.80	2131.82	9.70
	2005	12.70	159.22	7.95	9.41	54.40	5624.40	2637.91	4.20
	2006	6.12	122.56	5.80	20.01	59.40	3539.40	3797.91	2.80
	2007	7.99	110.47	11.98	42.96	57.34	7734.00	5127.40	3.00
	2008	12.30	97.51	7.33	41.22	64.13	3564.13	8008.20	1.30
	2009	9.00	66.61	5.58	14.79	47.35	3727.35	9411.11	1.00
	2010	7.90	55.41	5.23	25.39	48.44	4248.44	11034.94	8.00
	2011	8.30	78.01	7.89	26.97	54.18	5482.18	12172.49	12.00
	2012	10.90	74.18	9.05	28.71	58.38	2880.38	13893.22	12.00
	2013	12.70	147.31	6.47	53.93	42.60	4235.60	15154.64	20.00
	2014	5.60	101.94	5.20	91.02	570.80	3270.80	16238.52	20.00
	2015	9.60	90.21	9.14	40.49	44.12	4411.12	18525.22	22.50
	2016	8.80	93.74	10.08	126.24	56.96	3256.96	21624.63	22.50
	2017	7.00	156.82	7.22	147.97	52.37	8252.37	22363.43	22.50

20 18	11.70	152.93	11.55	169.71	58.16	5828.16	25079.72	22.50
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Source: Annual Reports of Selected Companies, various years.

The data presented in Table 1 showed that working capital management and performance across firms varied. The data showed that across the series, Unilever Nig. Plc. had a ROA of 16.70 percent in 2013 which happened to be the highest value while Guinness Nig. Plc. had the lowest ROA of 0.28 percent which was in 2016. For ICP, May and Baker Nig. Plc. emerged with the highest of 218.46 days while the lowest ICP of 51.27 days was observed for Unilever Nig. Plc. in 2000 and 2007, respectively. Data on DCP peaked at 63.91 days associated with Unilever Nig. Plc. in 2009 while the lowest DCP which was 5.20 days associated with May and Baker in 2014. With respect to CPP, it took May and Baker Nig. Plc. 169.71 days to pay off creditors in 2018 while the lowest number days was 9.41 days due to May and Baker Nig. Plc. in 2005.

Data Analysis

The data analysis began with a descriptive analysis, panel unit root test and Pooled Mean Group (PMG) as shown in subsequent Tables below:

Descriptive Analysis of Data

The descriptive analysis gave an insight into the nature of data used for the study. The results of the descriptive statistic were displayed in Table 2 as follows:

Table 2. Summary of Descriptive Statistic

	ROA	ICP	DCP	CPP	CCP	LOG(SALES)	M2	CRR
Mean	6.586809	118.1014	25.70362	45.15426	136.5506	8.522199	10246.39	11.80000
Median	6.255000	111.8250	23.46500	41.20000	37.05500	8.518448	9411.110	10.60000
Maximum	16.70000	216.9200	63.91000	169.7100	6675.000	10.44482	25079.72	22.50000
Minimum	0.280000	51.27000	5.200000	9.410000	24.76000	6.330149	878.4600	1.000000
Std. Dev.	3.347596	40.68097	15.04433	25.99867	711.4964	0.891328	7813.972	7.585286
Skewness	0.298890	0.385030	0.717209	2.165235	8.568038	-0.032541	0.392517	0.201983
Kurtosis	2.632913	2.312029	2.780533	10.14921	77.97084	2.815670	1.848835	1.698548
Jarque-Bera	1.927370	4.176325	8.247400	273.6345	23164.23	0.149668	7.604050	7.273114
Probability	0.381484	0.123915	0.016185	0.000000	0.000000	0.927898	0.022326	0.026343
Sum	619.1600	11101.53	2416.140	4244.500	12835.76	801.0867	963160.6	1109.200
Sum Sq. Dev.	1042.195	153909.5	21048.86	62861.56	47079121	73.88524	5.68E+09	5350.900
Observations	94	94	94	94	94	94	94	94

Source: Author's computations, (2019) using E-Views 10.0

The mean values associated with the panel data indicated that on average, across the sample, return on assets (ROA) reached about 6.57%, ICP had an average value of 119.15 days, DCP was 25.58 days on average, CPP hit an average of 25.58 days, CCP was 41.07 days on average, M2 recorded an average value of ₦10,147.78 million while CRR reached an average of 11.78%. The logged values of sales averaged 8.52. The maximum and minimum values showed the range of values associated with the variables. Again, the measure of skewness indicated that all the series were positively skewed. The Kurtosis revealed that the distribution was not normal since the values of Kurtosis were either greater than 3 or less than 3 which showed that the series were leptokurtic. This abnormality was confirmed by the Jarque-Bera test which revealed that apart from ROA and ICP all the other variables were not normally distributed.

Levin, Lin & Chu Panel Unit Root Test

In order to obtain unbiased estimates, diagnostic test was conducted by applying panel unit root tests (Pesaran, 2007). Hence, prior to the estimation, panel unit root test was carried based on Levin, Lin and Chu (2002) to determine the stationarity status of the panel data used for the study. The outcome of the Levin, Lin & Chu unit root test was presented in Table 3 below:

Table 3. Levin, Lin & Chu Unit Root Test Results

Variable	Levin, Lin & Chu t* @ level		Levin, Lin & Chu t* @ first difference		Order of integration
	t-Statistic	P-value	t-Statistic	P-value	
ROA	-0.34219	0.1020	-2.29143	0.0110	I(1)
ICP	-0.28378	0.3883	-4.06756	0.0000	I(1)
DCP	-2.03742	0.0208	--	--	I(0)
CPP	-0.67323	0.2504	-4.38690	0.0000	I(1)
CCP	-3.02836	0.0002	--	--	I(0)
Log(SALES)	-2.82518	0.0024	--	--	I(0)
Log(M2)	-3.29790	0.0005	--	--	I(0)
CRR	-0.16715	0.5664	-4.77549	0.0000	I(1)

Source: Author's computations, (2019) using E-Views 10.0

The Levin, Lin & Chu panel unit root test results indicated that the data were stationary at different levels. By integration mixed integration, the study followed the Pooled Mean Group (PMG) estimation approach to panel data as proposed by Pesaran, Shin & Smith (1997) was applied.

Test for Cross Sectional-Dependence

There is the need to perform cross sectional dependence test on the data to ensure that the cross section in the panel data analysis were independent for consistent coefficient estimates (Pesaran, 2004). The study adopted cross section dependence (CD) as presented in Table 4 below:

Table 4. Cross Sectional Dependence Tests

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	6.232143	10	0.7954
Pesaran scaled LM	-0.842518		0.3995
Bias-corrected scaled LM	-0.989577		0.3224
Pesaran CD	0.238058		0.8118

Source: Author's computations, (2019) using E-Views 10.0

Null Hypothesis: No cross-sectional dependence

The null hypothesis of the cross-sectional dependence test in Table 4 is rejected at 5% level of significance. This implied that there was no presence of cross-sectional dependence in the panel data. The p-values (0.7954, 0.3995 and 0.8118) associated with Breusch-Pagan LM, Pesaran scaled LM and Pesaran CD respectively were greater than 0.05. Also, the Breusch-Pagan LM indicated that the pooled regression based on the PMG method was suitable since the p-value (0.7954) was greater than 0.05 (Pesaran, 2004).

Panel Cointegration Test

Having confirmed that the panel data were of mixed stationary status, the cointegrating relationship among the variables were examined using Pedroni (1999) panel cointegration test. Pedroni (1999), checked the properties of residual-based tests for the null hypothesis of no cointegration for dynamic panels in which both the short-run and long-run dynamics slope coefficients were allowed to be heterogeneous across individual members of the panel. Also, Pedroni test examined both pooled within dimension tests and group mean between dimension tests with individual intercept in the test. The outcome of the Pedroni cointegration test was presented in Table 5 below:

As shown in Table 5, the Pedroni residual panel co-integration test showed that, the null hypothesis of no co-integration is rejected at 5% level of significance since Pedroni panel co-integration result revealed that seven (7) out of the eleven (11) of the Pedroni statistic significantly reject the null hypothesis of no co-integration. This is shown by the p-values of Panel rho-Statistic, Panel PP-Statistic, Panel ADF-Statistic, Group PP-Statistic and Group ADF-Statistic which were less than 0.05.

Table 5. Pedroni Cointegration Result

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-1.836453	0.7331	-2.07264	0.9781
Panel rho-Statistic	4.846351	0.0000	1.93774	0.8814
Panel PP-Statistic	-5.087460	0.0000	-2.93645	0.0040
Panel ADF-Statistic	-2.837463	0.0017	-2.18387	0.0039

Alternative hypothesis: individual AR coefs. (between-dimension)

Statistic	Prob.
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Group rho-Statistic	1.536647	0.8361
Group PP-Statistic	-4.038847	0.0000
Group ADF-Statistic	-3.536751	0.0005

Source: Author's computations, (2020) using E-Views 10.0

Also, an alternative measure of panel cointegration (KAO residual test) under the PMG method was used to confirm the outcome of the Pedroni residual cointegration test (Kao, 1999). The outcome of the KAO cointegration test was presented in Table 6 below:

Table 6. Kao Residual Panel Cointegration Result

	t-Statistic	Prob.
ADF	-1.964761	0.0247
Residual variance	11.04895	
HAC variance	4.147296	

Source: Author's computations, (2020) using E-Views 10.0

The probability value associated with the Kao test for cointegration confirmed the existence of a long-run relationship between working capital management and performance manufacturing firms in Nigeria. The implication of the Pedroni and Kao residual cointegration test was that the measures of working capital management and firm performance were strongly related in the long-run. Based on this premise, the study proceeded with the long-run estimations.

Pooled Mean Group (PMG) Estimation

From the pooled regression in Table 7, it was found that the estimation of PMG would yield optimal results based on the outcome of the adjusted R-squared, F-statistic and Durbin-Watson statistic. The adjusted R-squared of 0.650542 implied that approximately 70.55 percent of the total variations in return on assets (ROA) was due to the explanatory variables, that is, inventory conversion period (ICP), debt collection period (DCP), creditor's payment period (CPP), cash conversion period (CCP), sales value, broad money supply (M2) and cash reserve ratio (CRR). Also, the F-statistic (7.825098) suggested that the overall model was significantly different from zero, which implied that the model was well specified. Again, the Durbin-Watson statistic of 2.383137 implied that there was no serious autocorrelation in the specified regression model. The significance of the F-statistic suggested that the pooled regression model was stable.

Table 7. Pooled Regression Results, Dependent Variable = ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ICP	-0.008776	0.007241	-1.211947	0.2289
DCP	-0.055310	0.015251	-3.626533	0.0005
CPP	-0.001314	0.009088	-0.144558	0.8854
CCP	0.000517	0.000380	1.360068	0.1774

LOG(SALES)	-0.951172	0.152821	-6.224109	0.0000
LOG(M2)	-0.021515	0.004199	-5.123381	0.0001
CRR	-0.054219	0.046673	-1.161680	0.2486
C	12.92211	3.556842	3.633028	0.0005

Weighted Statistics

R-squared	0.772905	Mean dependent var	2.426453
Adjusted R-squared	0.705583	S.D. dependent var	1.240219
S.E. of regression	1.025504	Sum squared resid	90.44264
F-statistic	10.56833	Durbin-Watson stat	1.645400
Prob(F-statistic)	0.000000		

Source: Author's computations, (2020) using E-Views 10.0

The results of the long-run and short-run impacts of working capital management were presented in Tables 8 and 9 for the PMG method which follows the autoregressive distributed lag (ARDL) procedure (Pesaran, Shin & Smith, 1999). The optimal lag length of panel ARDL(1, 1, 1, 1, 1, 1, 1) was chosen for the PMG estimation following the Akaike information criterion (AIC).

Table 8. Long-run coefficients of the PMG estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ICP	-0.015564	0.011351	-1.371115	0.1776
DCP	-0.142167	0.023207	-6.125937	0.0000
CPP	-0.006085	0.008117	-0.749651	0.4576
CCP	0.031119	0.011670	2.666585	0.0169
LOG(SALES)	1.059523	0.383661	2.761613	0.0085
LOG(M2)	0.077588	0.345409	0.224627	0.8234
CRR	-0.141535	0.049091	-2.883095	0.0062

Source: Author's computations, (2020) using E-Views 10.0

The long-run coefficient of ICP implied that an increase in inventory conversion caused ROA to decrease by approximately 0.015564 in the long-run. Again, the long-run estimated coefficient of DCP implied that ROA diminished by about 0.142167 due to an increase in debt collection period. It was also found that an increase in creditors' payment period (CPP) accounted for 0.006085 decrease in ROA in the long-run. Also, increase in cash conversion period (CCP) caused ROA to accelerate by approximately 0.031119 in the long-run. The estimated coefficient of sales revenue (SALES) revealed that ROA increased by 1.059523 in the long-run. On the other hand, broad money supply (M2) had positive impact on ROA while cash reserve ratio (CRR) had negative on ROA in the model.

Table 9 below captured the results for the error correction mechanism and short-run PMG estimation. The coefficient (-0.975712) of COINTEQ01 was negative and significant as expected. This implied that there was a long-run convergence in the model. Specifically, this indicated that approximately 97.57 percent of the disequilibrium between the short-run and long-run in ROA of the

cross sections was covered up within a year. With an adjustment mechanism of 97.57 percent, it was concluded that the adjustment mechanism was rapid.

Table 9. Error Correction Mechanism and Short-run Coefficients of the PMG Estimation

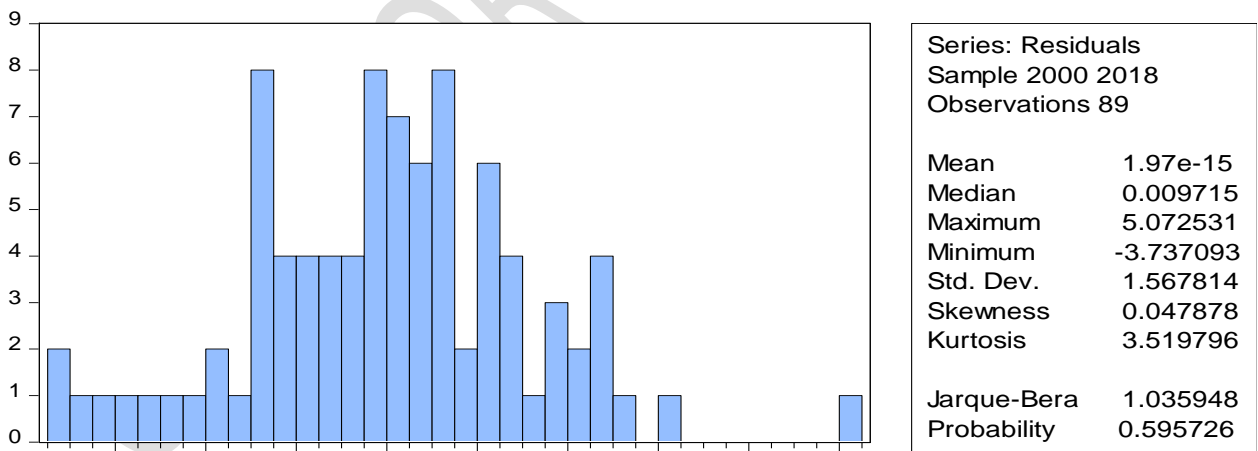
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
COINTEQ01	-0.975712	0.221468	-4.405649	0.0001
D(ICP)	-0.003535	0.016282	-0.217138	0.8292
D(DCP)	0.115922	0.037334	3.105021	0.0034
D(CPP)	0.026640	0.024875	1.070962	0.2903
D(CCP)	0.067412	0.108412	0.621814	0.5374
DLOG(SALES)	0.169635	0.931096	0.182189	0.8563
DLOG(M2)	-1.736009	2.802928	-0.619356	0.5390
D(CRR)	-0.060224	0.136911	-0.439880	0.6623
C	19.17066	4.164754	4.603072	0.0000

Source: Author's computations, (2020) using E-Views 10.0

The short-run estimated coefficients revealed that all the working capital indicators had positive impact on return on assets (ROA) while inventory conversion period (ICP) emerged with a negative coefficient.

Figure 1 below showed that the residuals of the PMG were normally distributed:

Figure 1. Test of Residual Normality



Null Hypothesis: Normal Distribution

Based on the p-value ($0.595726 > 0.05$) associated with the Jarque-Bera test, the null hypothesis of normal distribution could not be rejected. Hence, it was concluded that the residuals of the PMG were normally distributed.

Hypotheses Testing

The hypotheses testing was based on the outcome of the long-run PMG estimates based on the following decision rule:

- 1) Accept null hypothesis if p-value is greater than 0.05 (that, is 5%);
- 2) Reject null hypothesis if p-value is less than 0.05 (that, is 5%)

Ho₁: Inventory conversion period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.

The long-run p-value of ICP was $0.1776 > 0.05$. This implied that inventory conversion period has no significant impact on return on assets. Hence, the null hypothesis (H_{01}) was accepted.

Ho₂: Debt collection period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.

DCP emerged with a p-value $0.0000 < 0.05$. This implied that long-run debt collection period has a significant impact on return on assets. As a result, the null hypothesis (H_{02}) was rejected in favour of the alternative hypothesis.

Ho₃: Creditors' payment period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.

With a p-value $0.4576 > 0.05$, the impact of creditor's payment period was adjudged insignificant. As a result, the null hypothesis (H_{03}) was accepted.

Ho₄: Cash conversion period does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.

The p-value associated with CCP was $0.0169 < 0.05$. Based on this premise, the null hypothesis (H_{04}) was rejected that cash conversion period has no significant impact on return on assets. Hence, it was concluded that conversion cycle has a significant impact on ROA of selected manufacturing firms.

Ho₅: Sales revenue does not have a significant impact on return on assets (ROA) of listed manufacturing companies in Nigeria.

The p-value associated with sales revenue (SALES) was $0.0085 < 0.05$. This implied that sales revenue had significant impact on ROA. As such, the null hypothesis (H_{05}) was rejected in favour of the alternative hypothesis that sales revenue has a significant impact on ROA.

Discussion of Findings

The study found that inventory conversion period insignificantly explained changes in return on assets in the long-run. This implied that prolonged inventory conversion could cause diminishing impact on firm performance over a longer period. This finding was in line with Akoto, Awunyo & Angm (2013), supported this study that delay in inventory conversion period could cause a hitch to firms' cash flow, hence decrease in long-run firms' performance. Also, the finding that debt collection period had a negative impact on firm performance could be attributed to the delay by debtors in paying money owed to the firms. This was more significant in the long-run and in line with study of Eya (2016), who found that firms' performance reduced significantly due to debtor's inability to fulfil their financial obligations to firms as at when due. Similarly, Hassan, Imran, Amjad & Hussain (2014), supported this study by observing that firms listed in Pakistan failed to acquire new inventories due to longer debt collection period.

The study also found that increase in creditors' payment period had a negative and insignificant impact on firms' performance in the long-run. This implied that firms' performance had a long-term reaction to delay in paying creditors. Speaking on this scenario, Niresh (2012), affirmed that creditors usually lose trust when firms fail to settle those they owe. Similarly, Eya (2016); Deloof (2003); affirmed that delay in creditor's payment could discourage firms' suppliers from making further supplies of inventories over a long period of time. Hence, it could be said that stretching creditors' payment period might cause diminishing impact on firms' performance. On the other hand, cash conversion period had positive and significant impact on firms' performance in the long-run. Onodje (2014), affirmed that firms with higher cash conversion period responded with increased performance almost immediately. However, Nyarige & Olweny (2014), suggested that though cash conversion period (CPP) was expected to spur performance of firms. Again, the positive and significant impact of sales revenue is as expected. This is because the continuity of any enterprise comes through achievement of operating revenues, coupled with realized returns of positive cash flows from the operations of the enterprise. Without these sales' revenue, the company will be unable to meet its outstanding obligations. This was in tandem with the finding of Hayek (2018) that increase in sales revenue is the lifeblood of a company.

Summary of Findings, Conclusion and Recommendations

Summary of Findings

Having analyzed impact of working capital management on firms' performance in Nigeria, the following findings have been observed:

- 1) Inventory conversion period had a negative and insignificant impact on return on assets of selected firms in the long-run.
- 2) It was found that debt collection period had a negative and significant impact on firms' performance in the long-run.
- 3) Creditors' payment period had a negative and insignificant long-run impact on firms' performance in Nigeria.
- 4) Increase in cash conversion period had a positive and significant long-run impact on firms' performance in Nigeria.
- 5) Sales revenue has a long-run positive and significant impact on performance of manufacturing firms in Nigeria.

Conclusion

A sound working capital management of firms ensures that risks are minimized and value created for shareholders. As profitability increases; the firm grows and the amount of outsiders' contributions also increases. When profitability of firms is not proportional to outsiders' contributions, the firm becomes risky as the firm might be unable to meet-up its financial obligations as at when due, which in extreme cases, would lead to insolvency and low performance. Firms pursuing working capital policies increase profitability as revealed from the F-statistic. This study no doubt appropriately underlines the significance of working capital management for managers of Nigerian firms, a lesson after all for firms in developing countries (in which category Nigeria belongs). Therefore, the results has suggested that the model used was significant in jointly explaining impact of working capital management on firms' performance in Nigeria. Policies therefore need to take advantage of the opportunities presented by working capital management towards increasing firms' performance within the country.

Recommendations

Based on the findings of this study, the following recommendations have been made to guide policy:

- 1) Listed firms should have proper inventory management system to avoid over stock of inventory resulting efficient outcome of investment. It has to make sure certain standards and levels which would stop piling up inventory are maintained to ensure faster inventory conversion and higher firm performance.
- 2) To reduce debt collection period, customers' firms should endeavour to obtain information on their customers before starting a credit arrangement. Hence, to reduce overall debtor days, companies should keep customer information up to date.
- 3) Companies should engage in relationship with those suppliers who allow long credit time period and those customers who allow short payment period. Also, they should be able to negotiate better payment

terms to allow them utilize creditors' money in their operation which in turn enhances the firm performance.

4) Firms can shape cash conversion period by changing the way their businesses function in multiple areas, including sales, delivery, production, and billing and payment cycles. For instance, firm management can improve your CCP by collecting payments in full before production. This way they will only spend on inventory when necessary.

5) Manufacturing firms should identify ideal customers by making a list of all the benefits their customers will enjoy by using their products or services and then communicate such through viable advertisement mechanism as this would increase sales and firms' performance.

Contribution to Knowledge

This study has brought to the fore effect of working capital management on the performance of selected quoted manufacturing firms in Nigeria. The major contribution the study has added to existing body of knowledge on the subject matter is that working capital, as it is, can affect manufacturing firm's performance differently in the long-run and short-run.

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