Determinants of Working Capital Management: Case of Nigerian Manufacturing Firms

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Abstract

This study explored the factors determining the working capitalwith the view to providing information on empirical tests that constitutes the determinants of working capital management in the listed manufacturing firms in Nigeria.

The study used secondary data sources which were collected from the Annual Report and Accounts of sixty purposively selected non-financial quoted companies in the Nigerian Stock Exchange Fact book. Data on financial variables such as sales, purchases, inventory, creditors, debtors and total assets were extracted from the Annual Reports of these non-financial quoted companies between the periods 2000-2009. This was when the country started to experience financial policies for the banking sector under the democratic dispensation. Macroeconomic data on the annual growth rate of the Gross Domestic Product was obtained from the Statistical Bulletin of the Central Bank of Nigeria. Data collected were analyzed using descriptive and inferential statistics.

The results showed that the significant factors determining working capital included sales growth, size of the firm, gross domestic product, leverage. The proportion of fixed assets to total assets and the net trading cycle, also determined working capital but were not significant at the five percent level.

Keywords: working capital management, purposive, non-financial quoted companies, financial policies, democratic dispensation.

Introduction

Corporate finance basically deals with three decisions: capital structure decision, capital budgeting decision and working capital management decisions. Among these, working capital management defined as the ability of an organization to fund into the short term asset and short term liability is a very important component of corporate financing since it affects the profitability and liquidity of a firm or company and finally, its value Harris (2005). It deals with the way of financing current assets and liabilities. Its main goal is to ensure that companies have sufficient cash-flow to continue normal operations in such a way that minimize risk of inability to pay short-term liabilities Brigham &Gapenski (1994). Working capital management is important because of its effects on the firm's profitability and risk, and consequently, its value Smith (1980). Firm value is more important to have sustainable growth rate for a business to attract prospective investors. Since value of the firm is the form that investors motivate to invest in the business, an increase of value will benefit the firm's prestige by increasing future growth.Management of working capital helps managers to manage their operation of the firm through making available cash to pay for short-term debt and the maturity of long term debt as well as expenses resulting from daily operations. So, an optimal level of working capital must bekept to tradeoff between return and risk Ranjith(2008).

Problem Statement and objective: Determining the important factors affecting working capital management would help managers to determine the optimal level of investment in current assets as well as the appropriate sources of financing them. In addition, they will be well prepared and ready for unpredicted situations that have unexpected effects on firms' performance. Little attention was given to the determinants of working capital management while financial managers in Nigeria spent most of their time on working capital management.There are scanty empirical evidences on the factors determining working capital management in the manufacturing sector of the Nigerian economy. This study attempts to identify some of the factors which determine working capital management in Nigeria manufacturing firms. The theoretical contribution will enrich the existing literature by the determinants of working capital management in Nigeria manufacturing firms.

Literature Review

Theoretical Issues: The interaction between current assets and current liabilities is the main theme of the theory of working capital management. The theory describe how working capital should be managed and demonstrate the benefits in terms of liquidity, solvency, efficiency, profitability, and shareholders wealth maximization which accrue to the company from appropriately managing capital Brigham, et al (1999), Gitman (1997). Efficient working capital management implies sufficient liquidity in the operations of the enterprise and it involves planning and controlling current assets and current liabilities in a manner that eliminates the risk of inability to meet due short term obligations on one hand and avoid excessive investment on these assets on the other

handGitman (1997).   A firm is required to maintain a balance between liquidity and profitability while conducting its day-to-day operations. Liquidity is a precondition to ensure that firms are able to meet its short-term obligations and its continued flow can be guaranteed from a profitable ventureKesseven (2006).

Excessive as well as inadequate working capital positions are dangerous from the firm's point of view. Inadequate working capital not only impairs the firm's profitability but also results in productions interruptions and inefficiencies in sales disruptions. Too much working capital means holding costs and idle funds which earn no profit asinventory mishandling, wastes, theft and losses result. Aside from this, tendencies of accumulating inventories could cause speculative inventories to grow thereby fostering liberal dividend policy that might be difficult to cope with when the firm is unable to make speculative profitRamamoorthy(1976), and Pandey(2004).

Conceptual Issues: The working capital needs of a particular business are likely to change overtime as a result of changes in the business environment. This implies that working capital decisions are constantly being made. Managers try to identify changes in an attempt to ensure that the level of investment in working capital is appropriate. Changes in interest rates, changes in market demand, changes in the seasons, and changes in the state of the economy are crucial to the determinant of working capital. Changes arising within the business such as using different production methods (resulting perhaps in a need to hold less stock) and changes in the level of risk that managers are prepared to take could also alter the level of investment in working capital. As a result of expansion and contractions in the business cycle the investment in working capital will fluctuate in aggregate, and the composition of the constituent components of the investment in working capital can be subject to a considerable degree of volatility Richards and Laughlin(1980). The needs for working capital increase during period of economic growth, and should decrease as economic growth contracts Weston and Brigham(1992). For example when the economy is robust and in an expansionary phase, debtors and inventory may increase notably, whereas with the onset of a recession a prudent business may apply more restrictive credit policies thereby reducing credit sales, and hence debtors. Moreover production may be reduced because of a slacking in consumer demand. This will in all probability result in a reduction of inventory. Some businesses tend to build up working capital when the economy is strong, but then sell inventories and have net reductions of receivables when the economy slacks off Brighman et al. (1999).

Just as changes in business conditions have an impact on debtors and inventory, so too will they have an impact on the level of cash and on the forms and sources of financing of working capital. During an expansionary period, the increase in sales and hence production needs to be paid for, which in the normal course of business leads to an increased demand for cash. With the slowing of the cash conversion cycle during an economic slowdown, the level of working capital is likely to rise temporarily and with it will be an increase in the need for cash to finance a longer cash conversion cycle Asch and Kaye(1989), Richards and Laughlin(1980).

The business cycle has a considerable impact on the structure of time denominated assets (namely short-term and long-term assets). During a recession consumption may decline, which may result in debtors declining, doubtful and bad debts may increase, and stocks of unsold or unprocessed inventory may rise as production contracts; while during an expansion, consumption may increase, and debtors may increase as sales increases Nawrocki(1997). When the lending interest rate is high, firms would invest less in their working capital. During the marketing downturn, most factors play more significant role in determining working capital management while the factors appear to have less role for the firms that already have very high level of working capital. These findings lend support to pecking order hypothesis and agency theory and are of great interest to investors, corporate governors and regulators.

Further identifiable factors affecting working capital are: Nature, character and size of the business; seasonal variations/market and demand conditions; manufacturing and credit policies; price level changes; rate of stock turnover; the level of technology etc.

 Essentially, the management of working capital is influenced by external and internal factors. While external macro factors are affecting all companies regardless of industry, only companies within a particular industry are affected by external micro-factors. However, both opportunities and threats can arise from any of them. At an organization level, a set of internal factors impact on all processes and activities including working capital management but in different manners according to the direction and relationship between them. Consequently an ability to interpret and respond to the changes in these environmental variables is critical Johnson and Soenen (2003).

 Other notable factors are monetary policy and the manner in which it is implemented by virtue of its impact on price levels and exchange rate, fiscal policy because of the impact of taxation and the term structure of interest rates because of its impact on the cost of finance of different maturities Gitman(1997), Brigham and Gapenski(1994).

Empirical Evidence

Chiou and Cheng (2006) considered the factors affecting working capital management in Taiwan firms. The study considered both external and internal variables i.e. macroeconomic and firm specific variables. Their

findings indicated that (i) during the economic slump, firms have more working capital requirement, (ii) debt ratio, operating cash-flow to total assets are negatively associated to the working capital requirement (iii) Firm's age, return on assets are positively associated with working capital requirement.

Nazir and Afza (2008) examined the various factors that determine working capital requirement for 204 manufacturing firms for the period 1999-2006 in Pakistan. The results based on panel OLS estimation, found that operating cycle, leverage, return on assets (ROA) and Tobin's q are the internal factors which significantly influence working capital. The result also showed that working capital management practices are also related to industry and different industries are following different working capital requirements.

Caballero et al (2009) conducted a study to determine working capital management in small and medium-sized Spanish corporations (SMEs). The panel of 4076 SMEs firms over the period 2001-2005 was selected. Cash Conversion Cycle (CCC) was used as a comprehensive proxy for the efficiency of working capital management. Panel data analysis including OLS, regression and fixed effect model were applied. Their results indicated that (i) firms with longer CCC are older firms with more cash-flows. (ii) the CCC correlated negatively to the debt ratio, firm's growth, fixed assets investment and return on assets. (iii) No evidence for the effect of interest rates and GDP on the CCC.

Zaryawati et al (2010) investigated important factors which affect working capital management in Malaysian firms. Panel data analysis including pooled OLS regression was employed and the results compared to fixed effect and random effect models for robustness tests. Results indicated that (i) firm size; debt ratio and sales growth have negative relationship with the CCC. (ii) firms with more debt have less working capital since the cost of external financing is higher for these firms. (iii)a negative relationship between CCC and sales growth indicated that corporations use short-term financing to supply future demands. The positive relationship between economic growth and working capital indicated that firms expanded their investment on working capital during economic boom. Result found no evidence for the impact of corporate governance variables on working capital management.

Gill (2011) focused on the Canadian companies to determine working capital management. Applying panel data analysis, OLS regression and correlation coefficient, his results showed that working capital requirement positively correlated to the operating cycle, return on assets. Result further shows that working capital requirement negatively correlated to the firm size and Tobin's q. His findings indicated no significant relationship between working capital requirement, debt ratio and operating cash-flow.

Akinlo, (2012) Investigated the determinants of working capital requirements of 66 firms in Nigeria using panel data for the period 1997-2007 and the GMM. The results suggested that sales growth, firms' operating cycle, economic activity, size and permanent working capital are firm specific characteristics that positively drive working capital policy. Leverage was found to be inversely related to working capital requirements. The findings suggest that some of the insights from modern finance theory are potable to Nigeria.

Abbadi and Abbadi, (2013) studied the variables that determine working capital in Palestinian industrial firms. They established an econometric model and estimated parameters based on panel data for 11 Palestinian industrial companies listed on the Palestinian Security Exchange for the period 2004 to 2011. The study used working capital as the endogenous variable and some financial and economic variables such as cash conversion cycle, operating cash flow, leverage, farm size, return on assets, interest rate on loans and economic growth as exogenous variables. The study found that cash conversion cycle, return on assets and operating cash flow are significant determinants positively related to working capital requirement, while leverage and firm size are also significant but negatively related to working capital requirement. Economic variables such as interest rate and read GDP growth rate have no significant impact on working capital. Study also found that Palestinian firms maintain a sizable working capital which may be due to a long cash conversion cycle (over six months) and to conservative policies due to instable economic and political conditions.

Methodology

As at the time of this study, 237 firms cutting across over fifteen sectors of the Nigerian economy were listed on the Nigerian Stock Exchange. Only 186 firms are actively traded on the floor of the Exchange. These constitute the population for this study. The study excluded the financial sectors i.e. banking, insurance and investment sectors because of the peculiarity in their cash holding policies which are substantially different from that of the non-financially quoted companies. Sixty (60) nonfinancial quoted firms were purposively selected on sect oral basis such as breweries, chemical and paint, food and beverages, industrial/domestic products etc. The preparation and submission of annual reports covering the period of study (2000-2009), and the going concern basis qualifies a firm for selection. The selected firms from each sector are contained in table (i). Secondary data were employed consisting of computed variables from the balance sheet as well as the profit and loss account of the selected firms. Macroeconomic variables were sourced from the Central Bank of Nigeria's 2010 statistical bulletin.To investigate the determinants of working capital of selected quoted firms, we employed correlation matrix to measure the degree of association between different variables under consideration; and regression

analysis which entails the specifications of functional relationship between working capital requirement and its determinants.

Model Specification

We state our model as follows:

$$WC_{it} = \alpha_{it} + \alpha_1 SGR_{it} + \alpha_2 NTC_{it} + \alpha_3 LOS_{it} + \alpha_4 PFAF_{it} + \alpha_5 LEV_{it} + \alpha_6 GDP + \alpha_7 \text{ Control Variables} + \mathcal{E}_{it} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (i)$$

Where: WC represents the Working Capital

SGR is the sales growth

NTC is the Net Trading Cycle

LOS is the firm size

PFAF is the Proportion of firm's asset represented by fixed assets

LEV is Leverage

GDP is Business indicator

This equation states that working capital requirements measured as difference between working liquid assets less liquid liabilities and cash conversion cycle is a function of sales growth, net operating cycle, firm size, proportion of a firm's assets accounted for by fixed assets, leverage and business indicator measured as the growth rate of the level of economic activity.

Measurement of variables

Working capital is measured as the difference between working liquid assets less liquid liabilities. Sales Growth is measured as the current year sales less last year sales/ last year's sales. Net Trading Cycle is measured as the Average Collection Period plus (Inventory/ Net Sales) less (Accounts Payable/ Purchases). Firm Size is measured as the Natural Logarithm of Sales. Proportion of Firms Asset represented by fixed asset is measured as Fixed Assets/ Total Assets. Leverage is measured as Total Financial Debt/Total Assets. GDP is the business indicator measured as the growth rate of the level of economic activity.

Results

The statistics of different variables in our model for the determinants of working capital are presented in table (ii).The mean and median values are within the maximum and minimum values of the series. The relatively low standard deviations for most of the series indicate that the deviations of actual data from their mean values are very small. The statistics clearly show that the series are positively skewed meaning that all distributions have long right tail. In terms of the peakness or flatness of the distribution of the series measured by kurtosis, the data showed that the series are peaked relative to the normal except for the GDP. This is because the kurtosis of the other series exceeds 3. The probability that the Jaque-Bera statistic exceed (in absolute value) the observed value is generally low for all the series. This suggests the rejection of normal distribution at 5%.

The correlation matrix on table (iii) captured the variables in our model for the determinants of working capital. Leverage, size of the firm, proportion of fixed assets to total assets, sales growth and business indicator are positively related to working capital. This suggests that as these variables increases, working capital also increases.

Empirical models

The results of the determinants of working capital using panel regression models such as fixed effect and random effect model are presented on tables (iv) and (v). On the panel least square fixed effects, the results show a positive and significant relationship between the working capital and sales growth. This implies that increase in sales growth leads to increase in working capital. Using this model as the lead, a 1% increase in sales growth will lead to 0.046 increases in working capital. The coefficient of the net trading cycle is positive and insignificant in model II while it is negative and insignificant in model 1. The logarithm of sales is used to measure the size of the firm. The relationship between the size and working capital is positive and significant in the two models. This corroborates the view that larger firms have more financing alternatives available; hence these firms more easily afford investments in working capital. Size measured by the logarithm of sales could come out with a negative relationship when cash conversion cycle is used as a proxy for working capital. The cash conversion cycle actually measures the efficiency of working capital management by firms. If the regression comes out with a negative relationship, it will mean that the larger the firm size, the shorter the cash conversion cycle or the smaller the firm size, the longer the cash conversion cycle, suggesting that smaller firms should look for ways to shortening their cash conversion cycles.

The coefficient of the proportion of fixed assets to total assets is negative and insignificant in the two models. This suggests that as the proportion of fixed assets to total assets increases, the working capital decreases. There is no clear-cut definition of leverage in the academic literature. The specific choice depends on the objective of

the analysis. An additional issue is whether leverage should be computed as the ratio of the book or the market value of equity. We have measured leverage as the ratio of total financial debt to total assets. Our results show that leverage is negatively and significantly related to working capital. This indicates that with a rising debt to total assets ratio, the firms are supposed to pay more attention towards efficient management of Working Capital to avoid much capital being tied up in accounts receivables and inventories. Hence, firms with an increasing debt to total assets ratio (high leverage) show lower working capital requirement in support of the pecking order theory.

In the two models the gross domestic product is positively and significantly related to working capital. As this variable increases, working capital also increases. However, a fluctuation in the general economic activity in the long-run is expected to be negatively related to working capital. It might not be easy for a firm to raise fund during the period of economic fluctuations when cash supply is relatively tight. To retain capital for daily operations, working capital requirement must be kept at a higher level, and business indicator is expected to be negatively proportional to working capital. The expansion of a firm may not be as smooth as expected during economic fluctuations, with possibly longer time periods for collecting accounts receivable or possibly expended inventories due to decline in sales. Hence a relatively high net volume of working capital may occur.

Over the period of this study, the Nigerian economy did not witness significant progress in terms of economic growth. Perhaps the financial sector experienced boom during the period. Unfortunately, the boom in the financial sector did not filter into the productive sector especially the manufacturing sector. Increased lending rate, inconsistent power supply among others resulted into very high production costs during the period of study. This ripple effect of production leads to high product price and in a situation of elastic demand, consumers are likely to abandon the product in favour of imported close substitutes. Eventually, the firm may go into liquidation as it had been with the Nigerian Dunlop tyre and others leaving Nigeria for Ghana where the cost of production and power generation are relatively stable. Again, the Stock Market had not much to offer during the study period. This was as a result of the crash in the Stock Market.

Conclusions and Recommendations
Working capital management is crucial to firms as it is used to generate further returns for the shareholders. Allocating more than enough of working capital will render management non-efficient with adverse effect on short-term investments. If working capital is too low, the firm may miss a lot of profitable investment opportunities or suffer term liquidity crisis that could lead to degradation of company credit. This explains the rationale behind the knowledge of the determinants of working capital and its effects on profitability. Our study shows that the determinants of working capital are sales growth, trading cycle, size, proportion of firms' asset represented by fixed assets, leverage and business indicator measured as growth rate of economic activity. We recommend that these variables should be properly addressed to determine the optimal level of investments in current assets as well as the appropriate sources of financing them. The model for future studies should include as many other firm and nonfirm specific characteristics as evident in the literature.

Table (i) Sampled Firms

S/No	Sector/Industry	No. of Firms (Sample)	Percentage%
1	Food and beverages	10	16.7
2	Printing and publishing	3	5.0
3	Chemical and paints	6	10.0
4	Industrial and domestic products	7	11.7
5	Breweries	5	8.3
6	Building materials	5	8.3
7	Health care	9	15
8	Agriculture/Agro allied	5	8.3
9	Textile	2	3.3
10	Footwear	2	3.3
11	Automobile &Tyre	2	3.3
12	Conglomerate	4	6.7
	Total	60	100

Table (ii)

Descriptive Statistics

	SGR	NTC	LOS	PFAF	LEV	GDP
Mean	0.248327	67.33065	6.392388	0.383231	1.874579	530564.2
Median	0.179085	3.495094	6.800015	0.35	1.645	544753.7
Maximum	2.784609	9440.63	11.16846	1.026639	23.52427	716949.7
Minimum	-0.87364	-1372.78	1.92E-06	0.018727	-20.4854	329178.7
Std. Dev.	0.427012	568.6631	2.602353	0.206416	3.002946	124201.2
Skewness	2.962002	14.2846	-0.93265	0.789223	0.163871	-0.19553
Kurtosis	16.86175	233.605	3.319224	3.239764	27.40359	1.85819
Jarque-Bera	3029.893	719931.4	47.75037	33.98642	7941.902	19.42205
Probability	0	0	0	0	0	0.000061
Sum	79.4645	21545.81	2045.564	122.6339	599.8653	1.70E+08
Sum Sq. Dev.	58.1663	1.03E+08	2160.345	13.59177	2876.641	4.92E+12
Observations	590	590	590	590	590	590

Table iii

Correlation Matrix

	CCC	GDP	LEV	LOS	NTC	PFAF	SGR	WC
CCC	1	-0.08228	-0.00446	-0.1583	0.909762	-0.17573	-0.09706	-0.02356
GDP	-0.08228	1	-0.07681	0.064105	-0.07855	0.118008	0.086507	0.030497
LEV	-0.00446	-0.07681	1	0.068533	0.050306	0.066248	-0.05584	0.019528
LOS	-0.1583	0.064105	0.068533	1	-0.06567	0.320675	0.057041	0.663758
NTC	0.909762	-0.07855	0.050306	-0.06567	1	-0.13317	-0.0505	0.068866
PFAF	-0.17573	0.118008	0.066248	0.320675	-0.13317	1	0.054458	0.248822
SGR	-0.09706	0.086507	-0.05584	0.057041	-0.0505	0.054458	1	0.006314
WC	-0.02356	0.030497	0.019528	0.663758	0.068866	0.248822	0.006314	1

Source:AuthorsComputation.

Table (iv) Fixed Effect Model

Factors Determining Working Capital

Dependent variable: WC, Method: Panel Least Squares

Date: 09/07/1 Time: 12.19, Sample: 2000- 2009

Periods included: 10, Cross-sections included: 59, Total panel (balanced) observations: 590

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.080009	0.012570	6.365085	0.0000
SGR	0.046438	0.022480	2.065775	0.0093*
NTC	-0.000643	0.010019	-0.064144	0.9489
LOS	0.010920	0.002760	3.956243	0.0001*
PFAF	-0.000293	0.001578	-0.185425	0.8530
LEV	-0.042766	0.012590	-3.396917	0.0007*
GDP	0.032010	0.012980	2.466148	0.0140*

Effects specification

Cross-section fixed (dummy variables)

Period fixed (dummy variables)

R-squared	0.548841	Mean dependent var	0.153053
Adjusted R-squared	0.528038	S.D. dependent var	0.221505
S.E of regression	0.178852	Akaike info criterion	-0.487680
Sum squared resid	16.50590	Schwarz criterion	0.061691
Log likelihood	217.8657	Hannan-Quinn criter.	-0.273660
F-statistic 5.307212	Durbin-Watason stat	1.934631	
Prob (F-statistic)	0.000000		

*significiant at 5% level

Source: Authors Computa

Table (v) Random Effect Model

Dependent Variables: WC, Method: Panel EGLS (Two-way random effects), Date: 9/07/12. Time:12.19, Sample: 2000 -2009, Periods included: 10, Cross-sections included: 59, Total panel (balanced) observations: 590

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.080024	0.024967	3.205228	0.0014
SGR	0.35296	0.022075	1.598912	0.0104*
NTC	0.000214	0.009514	0.022463	0.9821
LOS	0.008104	0.002539	3.191682	0.0015*
PAFA	-0.000733	0.001494	-0.490351	0.6241
LEV	-0.047791	0.011997	-3.983689	0.0001*
GDP	0.036373	0.012507	2.908209	0.0038*

Effect specification

		S.D	Rho	
Cross-section random		0.088416	0.1812	
Period random		0.057718	0.0772	
Idiosyncratic random		0.178852	0.7416	

Weighted Statistics

R-squared	0.536072	Mean dependent var	0.049428
Adjusted R-squared	0.517387	S.D. dependent var	0.194495
S.E of regression	0.179591	Sum squared resid	18.80342
F-statistic	17.96957	Durbin-watson stat	1.939395
Prob (F-statistic)	0.000000		

*Significant at 5% level

Source: Authors Computation

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