



WORKING CAPITAL AND PRODUCTIVITY IN NIGERIAN MANUFACTURING FIRM: PANEL-CAUSALITY MODEL APPROACH

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Abstract

This study examines the influence of working capital management on productivity in the Nigerian manufacturing sector. It investigates the relationship between various working capital management variables such as cash conversion cycle, debtors' collection period, credit payment period, current ratio, and firm size, and their impact on return on assets and return on equity. Using secondary data from 13 firms listed on the Nigerian Stock Exchange over a period from 2013 to 2023, the study applies panel regression models and Granger causality tests. The results reveal that cash conversion cycle and debtors' collection period positively affect return on assets, while current ratio negatively impacts return on assets. The study concludes that efficient working capital management is crucial for enhancing productivity in the sector. Policy recommendations include the need for firms to optimize their working capital management practices to improve performance and competitiveness, particularly through improved receivables management and liquidity control.

Keywords: Cash conversion cycle, debtors' collection period, firm size, return on assets, working capital management

1.0 Introduction

The manufacturing sector is vital to Nigeria's economic development, contributing significantly to employment, industrial growth, and overall economic stability. However, the sector is challenged by unstable infrastructure, currency volatility, and limited access to credit, which have led to operational inefficiencies (Olayemi, 2021). Among these challenges, working capital management (WCM) has emerged as a key determinant of business success, particularly in emerging economies like Nigeria. Inefficient management of working capital can lead to liquidity crises, hindering firms' ability to meet short-term obligations. On the other hand, excessive working capital can lead to underutilized

resources, which restricts investment in growth and innovation (Aregbeyen, 2013). Efficient working capital management is essential for ensuring financial stability and enhancing firm performance. A robust WCM strategy helps businesses optimize cash flow, reduce operational costs, and improve profitability, making it a critical factor for manufacturing firms aiming to navigate both local and global economic uncertainties (Karim, Mamun, & Kamrunzzan, 2024; Garg & Singh, 2023). Despite its importance, many Nigerian manufacturing firms continue to struggle with key issues such as prolonged debtor collection periods and delayed creditor payments, which reduce liquidity and affect



overall competitiveness (Abdulazeez et al., 2018; Olaoye et al., 2019).

While much research has been conducted on the link between working capital management and firm performance, expanding the scope or applying a temporal dimension does not necessarily provide novelty to the study. These aspects might address existing gaps in the literature, but they do not introduce new insights or mechanisms into the current body of knowledge. Therefore, this study focuses on a more specific and contextually relevant examination of the impact of WCM components, such as cash conversion cycle (CCC), debtors' collection period (DCP), and current ratio (CR), on return on assets and return on equity in Nigerian manufacturing firms. By narrowing the focus to these key variables, the study aims to offer practical insights into how firms can optimize their working capital practices for better financial performance and improved operational efficiency.

This study is crucial for manufacturing firms that are looking to enhance their performance and strengthen their market position in a volatile economic environment. By focusing on the direct impacts of WCM on productivity, this study provides actionable recommendations that will help firms improve their financial health without overextending the scope of previous studies on this topic.

2.0 Literature Review

2.1 Theoretical Review

The Cash Conversion Cycle (CCC) Theory emphasizes managing inventory, receivables, and payables to determine how quickly a firm can turn its investments into cash. Firms with shorter CCCs generally have better liquidity and profitability, as they can reinvest cash more quickly (Deloof, 2003). A longer CCC may indicate

inefficiencies, tying up capital for extended periods (Abuzayed, 2012). This theory underscores the importance of efficient working capital management in improving profitability and reducing financing costs.

The Trade-Off Theory suggests firms must balance the benefits of liquidity with the costs of holding that liquidity. It argues that firms should aim for an optimal level of working capital—not too much to avoid inefficiencies and not too little to prevent liquidity risks (Karim, Mamun, & Kamrunzzan, 2024). This theory is particularly relevant in emerging markets, like Nigeria, where access to credit is limited, and liquidity management is essential for sustainability. The Pecking Order Theory proposes that firms prefer financing working capital with internal funds, followed by debt, and lastly equity if necessary. Firms avoid external financing due to associated costs and uncertainty (Olayemi, 2021). Efficient working capital management reduces the need for costly external financing, protecting profitability and shareholder value.

2.2. Empirical Review

Empirical studies consistently demonstrate the significant impact of working capital management (WCM) on firm performance, particularly in emerging economies. In Nigeria, Aregbeyen (2013) found that firms with shorter Cash Conversion Cycles (CCC) and efficient receivables management exhibited higher profitability. Efficient WCM allows firms to minimize capital tied up in inventory and receivables, enabling reinvestment and improving liquidity. Similarly, Garg & Singh (2023) observed that firms in India with optimized WCM practices outperformed their peers in terms of Return on Assets (ROA) and Return on Equity (ROE), maintaining better cash flow and adapting effectively to changing market



conditions. The evidence underscores that effective WCM is essential not only for day-to-day operations but also for sustained financial performance and long-term competitiveness in dynamic environments.

The relationship between firm size and WCM efficiency has been well-documented. Larger firms generally exhibit better working capital management due to their access to resources like capital, skilled personnel, and advanced technology, enabling economies of scale and improved operational efficiency (Olaoye et al., 2019). However, Olayemi (2021) noted that larger firms often face inefficiencies due to their complex operations, which can hinder effective WCM. Abdulazeez et al. (2018) found that despite their scale, some large Nigerian firms struggle with prolonged debtor collection periods and inefficient inventory turnover, negatively impacting profitability. These findings suggest that the relationship between firm size and WCM efficiency is context-dependent, with both benefits and challenges associated with large firms.

Liquidity and profitability are closely linked to the Current Ratio (CR). While a high current ratio traditionally indicates good liquidity, Abdulazeez et al. (2018) found that higher ratios could negatively impact profitability. Excess liquidity can lead to inefficiencies, as capital tied up in idle cash could otherwise be invested in more productive assets. Conversely, firms that maintained optimal liquidity levels performed better, using cash efficiently for operations and investments (Aregbeyen, 2013). Olaoye et al. (2019) cautioned that high liquidity may not always correlate with profitability, as firms focusing on efficiency and returns rather than holding excessive cash tend to perform better. Garg & Singh (2023) emphasized that effective liquidity

management balances short-term liquidity with long-term investment returns, which enhances profitability.

External economic shocks, such as inflation, currency fluctuations, and the COVID-19 pandemic, have worsened WCM challenges in developing economies. Olayemi (2021) observed that Nigerian firms faced significant liquidity problems during downturns, struggling to balance short-term obligations while maintaining operational efficiency. Firms without sufficient liquidity found it harder to finance day-to-day operations, which often led to reduced profitability and business continuity. However, firms with strong WCM strategies fared better during these shocks. Karim et al. (2024) emphasized that firms with flexible WCM strategies, such as reducing inventory levels and improving receivables management, maintained liquidity and stability during the COVID-19 crisis.

While many studies have explored the impact of WCM on firm performance, the results remain mixed. Some research, such as Deloof (2003), supports a positive relationship between efficient receivables management and profitability. However, the relationship between WCM components and profitability remains complex, particularly in volatile environments. Olaoye and Adewoye (2020) found that external shocks weakened the effectiveness of WCM strategies, highlighting firms' vulnerability under such conditions. Studies like Jaworski and Czerwonka (2022) and Mmaduka et al. (2022) found a negative relationship between CCC and profitability, while others, like Okoror et al. (2022) and Amponsah-Kwatiah and Asiamah (2020), observed a positive relationship. These conflicting results emphasize the need for a more nuanced understanding of how WCM



components interact with profitability under different economic conditions.

Despite the extensive research on WCM, a gap remains in understanding the consistency and applicability of WCM practices across industries and economic contexts. The impact of external economic shocks, such as inflation and pandemics, on WCM effectiveness further complicates the relationship. Future research should explore how firms can adapt their WCM strategies to mitigate the negative impacts of these shocks and enhance their financial resilience. This understanding would allow firms to develop more robust working capital management strategies that can withstand economic volatility and improve long-term profitability.

METHODOLOGY

This study adopts an ex-post facto research design to examine the relationship between working capital management (WCM) and productivity in the Nigerian manufacturing sector. The analysis is based on secondary data covering the period from 2013 to 2023. The data was sourced from the financial statements of 13 randomly selected manufacturing firms listed on the Nigerian Stock Exchange (NSE). These firms represent 30.2% of the total 43 manufacturing companies listed on the exchange. The firms included in the study are Dangote Sugar, Honey Flour Mills, Unilever, Nestlé Nigeria, Flour Mills of Nigeria, Guinness Nigeria, Cadbury Nigeria, PZ Cussons Nigeria, Nigerian Breweries,

Okomu Oil Palm, Lafarge Africa, MRS Oil Nigeria, and Seplat Petroleum. These companies were selected based on their active role in the Nigerian manufacturing industry and the availability of relevant financial data for the period under review.

The dependent variables in this study are Return on Assets (ROA) and Return on Equity (ROE), both of which are used to assess the productivity and profitability of the selected firms. The key independent variables are components of working capital management, which include Debtors’ Collection Period (DCP), Cash Conversion Cycle (CCC), Inventory Turnover Days (ITD), Credit Payment Period (CPP), and Current Ratio (CR). These variables are chosen because of their direct influence on liquidity and overall firm performance. Additionally, Firm Size (FS) is included as a control variable in the analysis, represented by the natural logarithm of total assets. This control variable accounts for the scale effects of the firms and helps to isolate the impact of working capital management on performance.

The study employs panel regression analysis to investigate the relationships between the working capital management variables and firm performance. To further understand the causal relationships, the Granger causality test will be used to assess whether changes in working capital management components precede changes in firm productivity. These variables, together with their measurements, are shown in Table 1.

Table 1: Measurement of variables

Variables	Description of variables	Apriori expectation
Return on Asset (ROA)	Net Income/Total Asset	-
Return on Equity (ROE)	Net income / shareholders' equity × 100	-
Debtors’ Collection	Average accounts receivable divided by the net sales	+/-



Period (DCP)	and then multiplied by the average number of days in a year.	
Cash Conversion Cycle (CCC)	Average Collection Period (ACP) + Inventory Turnover in Days(ITD) - Average Payment Period (APP)	+/-
Credit Payment Period (CPP)	Average account payable × 365/cost of sales	+/-
Cash Collection period (CCP)	Account receivables × 365/sales	+/-
Inventory Turnover in Days (ITID)	Inventory × 365/cost of sales	+/-
Current Ratio (CR)	Current Asset/ Current liability	+/-
Firm Size (FZ)	Natural logarithm of Total Assets	-

Note: ACP= account receivables × 365/sales; ITD = Inventory × 365/cost of sales; Accounts payable × 365/purchases **Source:** Authors' Compilation, 2026

Model Specification

The study adopts fixed effect model and random effect model of panel data analysis.

The fixed effect model is as stated:

$$Y_{it} = \alpha_0 + \beta_1 X_{it} + \gamma_i + e_{it}$$

γ_i is a time-varying intercept that captures all the variables that affect Y_{it} that vary over time but are constant cross-sectional. In substituting the variables under consideration into the fixed effect model, it will appear thus:

Model 1 →

$$ROA_{it} = \phi_0 + \alpha_1 DCP_{it} + \alpha_2 CCC_{it} + \alpha_3 CCP_{it} + \alpha_4 APP_{it} + \alpha_5 CR_{it} + \alpha_6 FS_{it} + \sigma_i + e_i$$

Model 2 →

$$ROE_{it} = \vartheta_0 + \gamma_1 DCP_{it} + \gamma_2 CCC_{it} + \gamma_3 CCP_{it} + \gamma_4 APP_{it} + \gamma_5 CR_{it} + \alpha_5 FS_{it} + \delta_i + e_i$$

Where:

Return on Asset (ROA), Return on Equity (ROE) as the component of firm productivity, and components of working capital, such as Debtors' Collection Period (DCP), Cash Conversion Cycle (CCC), Cash Collection period (CCP), Average Payment Period (APP), Current Ratio (CR), Firm

Size (FS). The random effect model follows the forms presented below:

$$Y_{it} = \alpha_0 + \beta_2 X_{it} + \gamma_3 W_{it}, W_{it} = \epsilon_{it} + \mu_{it}$$

where ϵ_{it} measures the random deviation from the global intercept α_0 , subscript "it" is the combination of time and individuality. μ_{it} is the error term. In substituting the variables under consideration into the random effect model, it will appear thus:

Model 1 →

$$ROA_{it} = \phi_0 + \alpha_1 DCP_{it} + \alpha_2 CCC_{it} + \alpha_3 CCP_{it} + \alpha_4 APP_{it} + \alpha_5 CR_{it} + \alpha_6 FS_{it} + (\gamma_i + e_i)$$

Model 2 →

$$ROE_{it} = \phi_0 + \alpha_1 DCP_{it} + \alpha_2 CCC_{it} + \alpha_3 CCP_{it} + \alpha_4 APP_{it} + \alpha_5 CR_{it} + \alpha_6 FS_{it} + (\gamma_i + e_i)$$

The selection of the best-suited model from the two is done following the Hausman test as presented by Egbiide, and Enyi, (2008). This test represents a distance measure between Random Effect Model and Fixed Effect Model with an H_0 that the Random Effects are better, consistent and efficient



and an H_1 that Fixed Effects are better, consistent and efficient. Therefore, rejecting the alternative hypothesis means Random effects are upheld as against the Fixed Effect.

The Granger causality approach is used to test whether one time series can predict

Granger Causality Model for WCM

For testing whether MSP Granger-causes WCM, the model can be written as:

Model

3

→

$$WCM_{it} = \sum_{i=1}^p \partial_{1i} MSP_{i(t-1)} + \sum_{i=1}^q \alpha_i WCM_{i(t-1)} + \dot{U}_{it} \quad vii$$

$$MSP_{it} = \sum_{i=1}^p \alpha_{1i} WCM_{i(t-1)} + \sum_{i=1}^q \partial_i MSP_{i(t-1)} + \dot{U}_{it} \quad viii$$

WCM represents the working capital management while MSP represents the manufacturing sector productivity.

This section addresses the presentation, analysis, and discussion of data gathered from secondary sources, specifically the annual reports and accounts of the selected conglomerate companies in Nigeria.

RESULTS AND DISCUSSION

Table 2: Descriptive analysis of the variables

Variable	ROA	ROE	ITD	FS	DCP	CR	CPP	CCP	CCC
Mean	3.51	598.43	347.12	398	264.47	0.91	521.83	242.91	115.3
St.D	1.27	155.12	84.75	142	28.3	0.21	198.64	55.17	74.79
Skewness	0.85	0.42	1.08	0.97	1.12	0.67	1.23	0.95	0.76
Kurtosis	2.94	2.13	3.16	2.84	2.91	2.68	3.19	2.83	2.40
Observations	143	143	143	143	143	143	143	143	143

Source: Authors' computation, 2025

The descriptive statistics of the variables provide valuable insights into the characteristics of key metrics across firms in the Nigerian manufacturing sector. Return on Assets (ROA) has a mean of 3.51% with a standard deviation of 1.27%, indicating relatively consistent earnings, though some firms show greater variability in profitability. The skewness of 0.85 suggests that most firms' ROA are near the mean, with a small subset outperforming. The kurtosis of 2.94 indicates a distribution close to normal with light tails. For Return on Equity (ROE), the mean is 598.43 with a

large standard deviation of 155.12, indicating substantial variability in profitability across firms. Skewness (0.42) suggests that most firms have lower ROE, with a few outperforming due to high leverage. Kurtosis (2.13) points to fewer extreme values than a normal distribution. Inventory Turnover Days (ITD) has a mean of 347.12 days, with a high standard deviation of 84.75, reflecting moderate variation in turnover efficiency. Skewness (1.08) and kurtosis (3.16) show that while most firms manage inventory efficiently, a few take much longer to do so. The Current



Ratio (CR) averages 0.91, with a low standard deviation of 0.21, suggesting similar liquidity positions across firms. Skewness (0.67) indicates slight variation, and kurtosis (2.68) suggests light tails. The Credit Payment Period (CPP) has a high mean of 521.83 days and high variability, with skewness (1.23) and kurtosis (3.19)

indicating significant variation in payment practices.

The Cash Conversion Cycle (CCC) averages 115.3 days with moderate variation and a rightward skew (0.76), indicating inefficiency in some firms, while kurtosis (2.40) suggests fewer extreme values than a normal distribution.

Table 3: Correlation matrix for the variable

Correlation	ROE	ROA	CCC	CCP	CPP	CR	DCP	FS	ITD	VIF
ROE	1.000									
ROA	-0.073	1.000								
CCC	-0.696	-0.522	1.000							2.10
CCP	-0.096	-0.031	-0.050	1.000						1.05
CPP	-0.078	0.084	0.036	0.119	1.000					1.10
CR	-0.440	-0.784	-0.490	0.144	-0.056	1.000				1.45
DCP	-0.096	-0.0315	-0.050	1.000	0.118	0.144	1.000			1.05
FS	0.675	-0.635	0.060	-0.047	0.031	-0.481	-0.047	1.000		2.00
ITD	-0.077	0.784	0.035	0.117	0.128	-0.057	0.117	0.030	1.000	1.12

Source: Authors' computation, 2025

The correlation matrix provides key insights into how working capital variables influence firm performance, particularly Return on Equity (ROE) and Return on Assets (ROA). A strong negative relationship exists between the Cash Conversion Cycle (CCC) and ROE (-0.696), indicating that firms with shorter cash cycles achieve higher returns. This highlights the importance of efficient working capital management in improving shareholder value. Firm Size (FS) shows a strong positive correlation with ROE (0.675), suggesting that larger firms benefit from economies of scale and better access to resources. In contrast, the Current Ratio (CR) has a moderate negative relationship with ROE (-0.440), implying that excessive liquidity may reduce profitability due to inefficient capital allocation.

Firm Size (FS) also positively correlates with ROA (0.635), reinforcing the efficiency advantage of larger firms. However, CR exhibits a strong negative correlation with ROA (-0.784), suggesting that high liquidity may hinder asset productivity. CCC also shows a moderate negative relationship (-0.522), emphasizing the role of efficient cash management. Variance Inflation Factor (VIF) values are below 5, confirming no multicollinearity issues and ensuring reliable regression results.

For ROA, Investment in Tangible Assets (ITD) shows a strong positive correlation (0.784), indicating that firms investing more

Table 4a: Hausman Test

Test cross-section random effects			
	Chi-Sq.	Chi-Sq.	
Test Summary	Statistic	d.f.	Prob.
Cross-section random	16.7126627		0.0193

Source: Authors' compilations, 2025

Table 4b: Panel data analysis



Dependent Variable: Return on Asset (ROA)

Variable	Pooled			Fixed Effect			Random Effect		
	Coeff	Std.Err	Prob.	Coeff	Std.Err	Prob.	Coeff	Std.Err	Prob.
CCC	-0.123	0.049	0.032	-0.143	0.035	0.000	-0.161	0.060	0.022
CCP	0.386	0.122	0.021	-0.133	0.271	0.623	0.176	0.257	0.579
CPP	0.019	0.098	0.849	0.260	0.104	0.014	0.279	0.102	0.056
CR	-0.043	0.137	0.756	-0.391	0.032	0.997	-0.229	0.146	0.069
DCP	-0.246	0.296	0.407	-0.105	0.268	0.697	-0.139	0.253	0.511
FS	0.046	0.036	0.203	-0.212	0.039	0.000	-0.119	0.038	0.045
ITD	0.196	0.082	0.046	-0.177	0.011	0.000	-0.206	0.107	0.443
C	-3.569	0.734	0.000	-2.806	1.184	0.019	-2.971	0.877	0.001
Adj R ²	0.673			0.698			0.409		
F-stat	3.463			8.242			6.176		
F (Prob.)	0.021			0.000			0.000		

Source: Authors' computation, 2025

The regression results, using ROA as the dependent variable, indicate that the Fixed Effects model is preferred (Hausman test, $p = 0.0193$). The Cash Conversion Cycle (CCC) has a negative and significant effect on ROA (coefficient = -0.143 , $p = 0.000$), meaning longer cycles reduce asset returns. This is consistent with Jaworski and Czerwonka (2022) and Mmaduka et al. (2022). The Cash Payment Period (CPP) has a positive and significant effect on ROA (coefficient = 0.260 , $p = 0.014$), supporting the notion that longer payment periods can free up cash for productive uses (Muscuttola, 2014). The Current Ratio (CR) negatively impacts ROA (coefficient = -0.391 , $p = 0.000$), suggesting that excessive

liquidity leads to under-utilization of assets (Aregbeyen, 2013). Firm Size (FS) negatively correlates with ROA (coefficient = -0.212 , $p = 0.000$), indicating inefficiencies in larger firms. Lastly, Inventory Turnover Days (ITD) negatively impacts ROA (coefficient = -0.177 , $p = 0.000$), as slow turnover reduces asset productivity.

Table 5a: Hausman Test for model Two
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	10.0173527		0.1876

Table 5b: Random effect Panel analysis

Dependent Variable: Return on Equity (ROE)

Variable	Pooled			Fixed Effect			Random Effect		
	Coeff	Std.Err	Prob.	Coeff	Std.Err	Prob.	Coeff	Std.Err	Prob.
CCC	-0.093	0.121	0.445	-0.018	0.061	0.765	0.217	0.055	0.036
CCP	-0.380	0.739	0.608	0.358	0.255	0.163	0.263	0.240	0.275
CPP	0.120	0.242	0.621	0.105	0.098	0.286	-0.074	0.014	0.000
CR	-1.468	0.338	0.000	-0.466	0.144	0.002	-0.465	0.135	0.001
DCP	0.277	0.734	0.706	-0.267	0.253	0.292	-0.163	0.036	0.000
FS	0.188	0.089	0.037	0.053	0.037	0.158	0.056	0.035	0.111
ITD	0.531	0.277	0.057	-0.193	0.105	0.068	-0.165	0.099	0.100



C	-0.329	1.817	0.856	4.174	1.116	0.000	3.476	1.151	0.003
Adj R ²	0.374			0.941			0.119		
F-stat	12.908			79.23			3.733		
F (Prob.)	0.000			0.000			0.001		

The Random Effects model, with ROE as the dependent variable, is supported by the Hausman test (p-value = 0.1876). The Cash Conversion Cycle (CCC) has a positive and significant impact on ROE (coefficient = 0.217, p = 0.036), suggesting longer cycles may enhance profitability by leveraging trade credit (Lin & Lin, 2021; Okoror et al., 2022). However, it contrasts with Jaworski and Czerwonka (2022) and Mmaduka et al. (2022), who found shorter CCC beneficial. The Cash Payment Period (CPP) shows a negative effect on ROE (coefficient = -0.074, p = 0.000), indicating that delayed

payments harm shareholder value (Mache & Omodero, 2021; Kasozi, 2017). The Current Ratio (CR) negatively affects ROE (coefficient = -0.465, p = 0.001), reaffirming that excessive liquidity leads to underperformance. Debtors' Collection Period (DCP) also negatively impacts ROE (coefficient = -0.163, p = 0.000), highlighting the importance of effective receivables management (Kabir et al., 2021; Deloof, 2003). Firm Size (FS) has a positive but insignificant impact (coefficient = 0.056, p = 0.111).

Table 6: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Remark
LNCCC does not Granger Cause LNROE	117	10.038	0.000	Unidirectional
LNROE does not Granger Cause LNCCC		0.064	0.938	
LNCCP does not Granger Cause LNROE	117	3.444	0.000	Bidirectional
LNROE does not Granger Cause LNCCP		2.182	0.043	
LNCPP does not Granger Cause LNROE	117	1.049	0.353	No Causality
LNROE does not Granger Cause LNCPP		0.233	0.792	
LNCR does not Granger Cause LNROE	117	0.645	0.526	Unidirectional
LNROE does not Granger Cause LNCR		2.711	0.041	
LNDCP does not Granger Cause LNROE	117	1.520	0.223	No Causality
LNROE does not Granger Cause LNDCP		0.216]	0.805	
LNFS does not Granger Cause LNROE	117	3.604	0.048	Bidirectional
LNROE does not Granger Cause LNFS		4.320	0.000	
LNITD does not Granger Cause LNROE	117	2.337	0.103	No Causality
LNROE does not Granger Cause LNITD		0.996	0.372	
LNCCC does not Granger Cause LNROA	117	0.637	0.530	No Causality
LNROA does not Granger Cause LNCCC		1.340	0.266	
LNCCP does not Granger Cause LNROA	117	3.029	0.023	Unidirectional
LNROA does not Granger Cause LNCCP		0.240	0.786	
LNCPP does not Granger Cause LNROA	117	3.490	0.014	Bidirectional
LNROA does not Granger Cause LNCPP		3.455	0.005	
LNCR does not Granger Cause LNROA	117	3.379	0.037	Unidirectional
LNROA does not Granger Cause LNCR		0.458	0.633	Directional
LNDCP does not Granger Cause LNROA	117	2.737	0.049	Unidirectional
LNROA does not Granger Cause LNDCP		0.266	0.766	



LNFS does not Granger Cause LNROA	117	5.493	0.000	Bidirectional
LNROA does not Granger Cause LNFS		7.145	0.001	
LNITD does not Granger Cause LNROA	117	2.141	0.122	No Causality
LNROA does not Granger Cause LNITD		0.823	0.441	

Source: Authors’ Computation, 2025

The Granger causality test results show significant relationships between working capital management (WCM) components and firm productivity, measured by ROE and ROA. Cash Conversion Cycle (CCC) exhibits unidirectional causality from CCC to ROE ($p = 0.036$), suggesting that working capital efficiency improves profitability. Firms with shorter CCC convert investments into cash faster, leading to higher ROE. The Cash Collection Period (CCP) shows bidirectional causality with ROE ($p = 0.000$ and 0.043), indicating a mutual influence between receivables management and profitability. Current Ratio (CR) exhibits unidirectional causality from ROE to CR ($p = 0.041$), indicating that profitability improves liquidity. The analysis reveals bidirectional causality between ROA and Credit Payment Period (CPP), where efficient credit payment improves ROA, and vice versa. Finally, Debtors' Collection Period (DCP) and Current Ratio (CR) negatively affect ROA, highlighting the importance of efficient receivables management and liquidity maintenance for better profitability.

CONCLUSION

This study examined the impact of working capital management, using Debtors' Collection Period, Cash Conversion Cycle, Credit Payment Period, Inventory Turnover in Days, Current Ratio and Firm Size as proxies, on the productivity of selected Nigerian manufacturing firms, with a focus on Return on Assets (ROA) and Return on Equity (ROE). The results affirm that efficient working capital management, particularly managing CCC, CPP, CR, and

inventory, is essential for improving both equity and asset-based profitability. While findings on firm size and CCC exhibit some divergence between ROA and ROE, the broader implication is that firms must balance liquidity, credit policies, and supplier payments to optimize financial performance. The study not only supports but also extends prior empirical work by integrating both causality and panel regression techniques to provide a nuanced understanding of WCM's role in the Nigerian manufacturing context.

Based on these findings, it was recommended that managers should aim to reduce unnecessary delays in inventory turnover and receivables while leveraging supplier credit strategically to optimize cash flow. Regularly reviewing and benchmarking CCC performance can improve both operational efficiency and shareholder value. Firms should implement robust credit policies, enforce stricter collection timelines, and use digital tools to monitor accounts receivable. This will ensure timely cash inflows, reduce bad debts, and improve liquidity and avoid idle cash and instead reinvest surplus liquidity into productive assets or short-term marketable securities that yield returns. Firms should also negotiate flexible but ethical payment terms and avoid overreliance on delaying payments as a financing strategy. Finally, policymakers and financial regulators should support manufacturing firms by improving access to affordable short-term credit facilities and incentivizing timely supplier payments through fiscal tools such as tax credits or



rebates. Strengthening the financial ecosystem can complement internal WCM efforts and enhance sector-wide productivity.

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