# An Empirical Analysis of Nexus between Working Capital Management, Policy and the Corporate Profitability of Listed Non-financial Firms in Nigeria

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*Abstract:* - The economic recession in Nigeria and the effect of COVID-19 on quoted companies has brought to fore the need for an effective working capital management. Managers need to understand the dynamics of investing, financing and managing of working capital in achieving business sustainability and maximization of shareholders' wealth. It is against this backdrop that this study assessed the link between working capital management (WCM), working capital policy (WCP) and corporate profitability of listed non-financial firms in Nigeria. We used a sample of 109 Listed Non-financial Firms on the Nigeria Exchange Group from 2011 through 2020. The purpose of this paper is to establish a relationship that is statistically significant between profitability, Working Capital Management Policy and its components for listed firms in the NSE which was estimated by the static panel regression model computed in STATA 14 statistical software. The results of our research showed that there is statistical significance between profitability, measured through return on capital employed, and the components of working capital management (WCM): cash conversion cycle and working capital investment policy. Although, a negative and no statistical relationship is observed between profitability, measured through return on capital employed and working capital financial policy which is the proxy for working capital policy (WCP). Managers should take advantage of the effect observed by keeping CCC in a well-controlled and reasonable period as the level of impact achievable is based on management strategy. Furthermore, the study has shown that if firms invest more in current assets their profit will be significantly affected. Managers should however put into account the nature of their business and identify the optimal level that brings the highest return as the associated cost of holding current assets may outweigh the gain later..

*Key-Words:* - Working Capital Management, Working Capital Policy, Return on Capital Employed

Received: September 17, 2021. Revised: May 23, 2022. Accepted: June 15, 2022. Published: July 22, 2022.

## 1 Introduction

From 2011 and 2020, Nigeria experienced an erratic economic trend, recession and negative economic impact of both insecurity and COVID-19 that put businesses in financial crises ([1]; [2]; [3]). According to PwC Nigeria, Economic [4] challenges of foreign exchange illiquidity and insecurity in the country inhibited the growth of many business sectors, and companies tend to fail in financial distress due to inadequate working capital [5]. Reduction in the available working capital of some listed non-financial firms (Guinness Nigeria PLC, UACN Plc, Nigeria Breweries PLC, Afromedia PLC, GlaxoSmithKline PLC, Chams PLC, 11 PLC and Chellerams PLC) by 36%, 49%, 111%, 11%, 2%, 23%, 29%, and 162% respectively between 2019 and 2020 contributed to the grossly lower profit before tax of these firms by 140%,204%, 49.81%, 7.08%, 14%.364%, 31% and 128% respectively. This has now made it expedient to take a deeper look at the management of working capital to maintain the liquidity, survival, solvency and profitability of listed firms, especially during the economic downturn ([6]; [7], [8]; [9].

Likewise, discourse on working capital and profitability has been ongoing for years but either working capital management or working capital policy have been the determinants [10], [11]; [12]; [13]; [10]. However, working capital management and capital structure are two scopes that academics frequently explore in order to predict a firm's profitability. There have been a variety of approaches to working capital management.. Other studies that confirmed a significant effect and positive relationship between working capital management, working capital policy and financial performance include [14], [15], [16], [17] and [18]. Conversely, studies by Azeez (2017), [19], [20],

[21], [22] and Likewise, [23] amongst others posited that a negative and significant relationship between the working capital management and policy on cooperate profitability and profitability.

While WCM and WCP which have a complementary effect on firm performance are yet to be jointly thoroughly explored. Also, many companies are still out of business as a result of their poor working capital management and weak working capital investment and financing strategies [24], because the maintenance of adequate solvency and maximization of profitability requires the right balance between short-term sources of financing and short-term investments in current assets [25]. This has necessitated the need for further research on the relationship between corporate profitability, WCP and WCM to acquire knowledge to curb the decline of working capital level and reduce the chances of businesses failing.

Furthermore, the focus of this study is listed non-financial firm in Nigeria which consists of several sectors involved in manufacturing, production, telecoms and provision of utilities that require large capital investment. However, extant studies scarcely considered a comprehensive profitability measure like return on capital employed (ROCE) which shows how well a firm is generating profits from invested asset [26]. ROCE is measured by profit before interest and tax to total capital employed ratio. It eliminates the influence of tax rates in determining corporate financial performance, allowing for more equitable horizontal comparisons between enterprises, especially capital-intensive industries [27]. The ROCE can help discover firms that have the potential to make more money and management that can efficiently allocate capital and resources.

# 2 Problem Formulation

It is based on these realities that this study focused on analysing the nexus between WCM, WCP, and the corporate profitability of listed non-financial firms in Nigeria by adopting the accounting-based measure of profitability- return on capital employed (ROCE). Therefore, the study explicitly examines the effect of the cash conversion cycle, working capital investment policy and working capital financial policy on the return on capital employed by listed non-financial firms in Nigeria. The study also considers that the non-financial firms in Nigeria consist of 10 sectors with varying operational procedures and different working capital requirements, hence will determine the individual influence of each sector, to check if the relationship observed is sector bias. This therefore diagrammatically illustrated in figure 1 below.

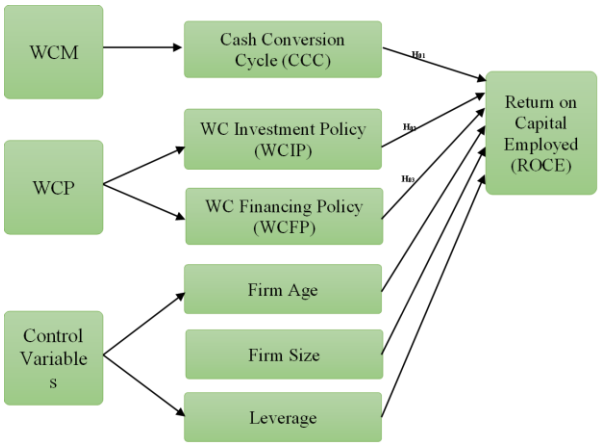


Fig. 1: Study Conceptual Model and Hypotheses Path

## 2.1 Study Theoretical Framework

The cash conversion cycle (CCC) theory was chosen because it provided a comprehensive approach to determining the ideal working capital level for firms and encompasses the other three components of working capital management, accounts payable period, accounts receivable period, inventory period and; and directly affects the liquidity and profitability of the firm [28]; [29], [30]. CCC represents the flow of cash within the company as it predicts how long cash is tied up in its operations [16]. According to the CCC theory, all things being equal, a short CCC will lead to an increase in the firm's profitability, liquidity and firm value; while a longer one will cause a lower firm value and profitability [31], [32]; [33]; [34].

Figure 2 is a pictorial representation of the cash conversion cycle theory. It shows the relationship among the components of CCC (inventory period, accounts receivable period and accounts payable period) and a pictorial presentation of the difference between the operating cycle and CCC. The length of the average payment period partly indicates how much current liabilities is used in financing current assets investments. The cash conversion cycle can be shortened by increasing the average payment period and reducing the inventory and average collection periods.

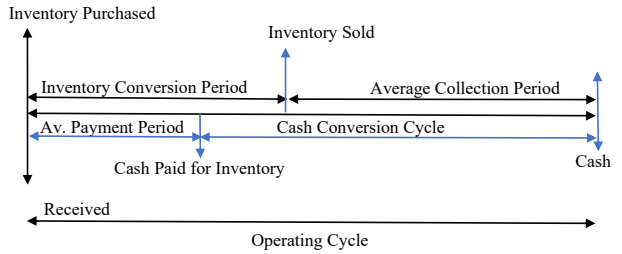


Fig. 2: Cash Conversion Cycle

This choice of theory is inconsonant with the studies of [35], [31], [1], [36], [37], [38] and [39] who have used the CCC theory as the foundation for their studies.

### 2.1.1 Methodology

A secondary method of data collection was used for this study as the relevant data were extracted from the financial statements of all 109 non-financial firms from 2011 to 2020. These firms are categorized into 10 different sectors: Agriculture (5), Conglomerates(5), Construction/Real Estate(8), Consumer Goods(19), Healthcare(10), ICT(9), Service(25), Industrial Goods(13), Oil & Gas(11) and Natural Resources(4). Outside the identified variables, some other variables could affect the outcome of this study. To achieve a fair result, the outcome is then protected from other possible impacts by using control variables [40]. Following the examples of previous research work like [41], [42], [14], [8], [10], [16], [22] Firm age, size and leverage are chosen as the control variables for this study.

### 2.1.2 Model Specification

$$ROCE_{it} = \beta_0 + \beta_1(CCC)_{it} + \beta_2(WCIP)_{it} + \beta_3(WCFP)_{it} + \beta_4(AGE)_{it} + \beta_5(FS)it + \beta_6(LVG)_{it} + Sector\ (Dummy.i) + e_{it}$$

*Where:*

*ROCE = Return on capital employed*
*CCC = Cash Conversion Cycle*
*WCIP = Working Capital Investment Policy*
*WCFP = Working Capital Financing Policy*
*AGE = Firm Age*
*FS = Firm Size*
*LVG = Leverage*
*Sector (Dummy.i) = Dummy Sector. It is a vector of the sectors that captures all the ten sectors (Agriculture, Conglomerate, Construction & Real Estate, Consumer Goods, Health Care, ICT, Industrial Goods, Natural Resources, Oil & Gas and Services). ei = random error term which takes care of the effects of other factors which are not fixed in the model, on dependent variable*

*$\beta 0$ = Intercept/Regression Constant;*
*i =Firm*
*t = time*
*$\beta 1$, $\beta 2$, $\beta 3$, $\beta 4$, $\beta 5$, $\beta 6$ are the regression coefficient associated with independent variables. The dependent and independent variables are computed variables and ratios, the measure of the variables is stated in Table 1.*

Table 1. Measure of Variables

| Variables | Measure | Abbreviation | Type of Variable |
|---|---|---|---|
| Return on Capital Employed | Profit before Interest and Tax / Capital Employed | ROCE | Dependent Variable |
| Cash Conversion Cycle | Inventory Period + Average Receivable Period - Average Payment Period | CCC | Independent Variable |
| Working Capital Investment Policy | Total Current Assets / Total Assets | WCIP | Independent Variable |
| Working Capital Financing Policy | Total Current Liabilities / Total Assets | WCFP | Independent Variable |
| Firm Age | Number of years from incorporation to 2020 | AGE | Control Variable |
| Firm Size | Total Asset | SIZE | Control Variable |
| Leverage | Total Debt / Total Assets | LVG | Control Variable |

*Source: Author's Computation, 2022*

### 2.1.3 Method of Data Analysis

Panel Data Regression Analysis which was adopted by [43], [44] and [45], [46] is also used for this study to give an estimation result that is Best Linear Unbiased (BLUE) [41]. Panel Data Regression is a combination of cross-section data and time series, the same individual/cross-section unit is measured at different times [47]. This approach can predict the effect more than one independent variable (CCC, WCIP and WCFP) has on the dependent variable

(ROCE). The computation device used for this estimation is the STATA 15 software [48].
In employing panel data to estimate the regression model, three approaches can be used [49]; [50]: Common Effect Model or Pooled Least Square (PLS), Fixed Effect Model (FE) and the Random Effect Model (RE). The Hausman test is used to determine the more appropriate method between Fixed Effect (FE) and Random Effect (RE). All tests are carried out at five per cent (5%) level of significance. Hence all null hypotheses were only rejected where the p-value was less than 0.05. Where p-value was greater than 0.05, the hypotheses were not rejected.

# 3 Empirical Results and Discussions

## 3.1 Summary of Descriptive Statistics

The subsection reports the summary statistics. The population of this study is made up of all the one hundred and nine (109) non-financial firms listed in the Nigeria Exchange Group for the period of ten years, 2011 -2020. Table 4 displays their descriptive statistics for Return on Capital Employed (ROCE), Working Capital Financing Policy (WCFP), Working Capital Investment Policy (WCIP) Cash Conversion Cycle (CCC) and the control variables, Firm Age, Firm Size and Leverage The summary statistics revealed that the data set in the panel is balanced since we were able to obtain equal timeframe (10 years each) for all the cross-sections (firms).

Table 2. Summary of Descriptive Statistics

| | ROCE | CCC | WCIP | WCFP | AGE | FS | LEV |
|---|---|---|---|---|---|---|---|
| Mean | 1.083 | 16.716 | 10.363 | 8.884 | 42.491 | 22.626 | 0.199 |
| Median | 1.187 | 13.125 | 9.045 | 7.255 | 40.000 | 22.535 | 0.112 |
| Maximum | 2.640 | 438.620 | 43.810 | 43.380 | 142.000 | 29.360 | 1.923 |
| Minimum | -0.952 | 0.010 | 0.000 | 0.000 | 1.000 | 0.000 | 0.000 |
| Std. Dev. | 0.326 | 19.651 | 7.722 | 6.626 | 24.611 | 3.120 | 0.269 |
| Skewness | -2.380 | 10.986 | 0.862 | 1.099 | 1.069 | -3.429 | 2.931 |
| Kurtosis | 11.140 | 212.265 | 3.561 | 4.409 | 4.950 | 26.310 | 13.968 |
| Jarque-Bera | 4038.785 | 2010797.000 | 149.174 | 309.632 | 380.165 | 26813.150 | 7023.703 |
| Probability | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Sum | 1180.473 | 18220.960 | 11296.050 | 9683.430 | 46315.000 | 24662.190 | 216.541 |
| Sum Sq. Dev. | 115.676 | 420526.000 | 64928.660 | 47818.390 | 659582.400 | 10602.930 | 78.643 |
| Observations | 1090 | 1090 | 1090 | 1090 | 1090 | 1090 | 1090 |

*Source: Author's Computation (2022)*

The total is expected to be 1090 data points (from 10 years for all the 109 non-financial firms listed in Nigeria used for the analyses). Each company is unique and has varying data, thus no variable is repeated for any company and all the variables are in natural logarithm. Mean is the average value of the sequence resulting from the division by the number of measurements of the total value of the variable. In the panel, all the series which make up the panel are taken into account; it also includes the average panel. From table 4.1 the mean of Return on Capital Employed (ROCE), WCIP, CCC, WCFP, firms age (AGE), firms size (FS) and Leverage (LEV) are 1.083. 16.716. 10.363, 8.884. 42.491. 22.626 and 0.199 respectively.

Also, the Standard deviation is how the dispersion or spread in the series is measured. Table 4.1, shows the standard deviation for ROCE, Cash Conversion Cycle (CCC), Working Capital Investment Policy (WCIP) are 0.326, 19.651, 7.722, 6.626, 24.611, 3.120 and 0.269 respectively. This shows that the rate of spread of the variables over the period under study is on average similar but CCC is more widely spread than any other variable while ROCE has comparatively a minimal spread of all the independent variables.

The Jarque-Bera normality test which is a precondition for fitting the panel regression model is stated. Although, the normality test for all the variables return a p-value less than 0.05 (5%) level of significance, thus implying that none of the variables is normally distributed and as such the variable natural logarithm transformation was used to correct for the non-normality seen in the series before fitting the panel model.

**Pre-Estimation Test**

In order not to undermine the accuracy of outcomes, pre-estimation tests are done to check for the probability of the presence of conditions and biases. They are done to establish that the data meet the panel regression model's essential assumptions.

Table 3. Unit Root Test Result

| Variable | Statistic (Adjusted t*) | p-value |
|---|---|---|
| Levin-Lin-Chu unit-root test for ROCE | -11.43 | 0.000 |
| Levin-Lin-Chu unit-root test for CCC | -18.8563 | 0.000 |
| Levin-Lin-Chu unit-root test for WCIP | -15.8067 | 0.000 |
| Levin-Lin-Chu unit-root test for WCFP | -20.9606 | 0.000 |
| Levin-Lin-Chu unit-root test for FS | -16.4904 | 0.000 |
| Levin-Lin-Chu unit-root test for Lev | -13.8718 | 0.000 |

*Source: Author's Computation (2022)*

In testing for stationarity, with a p-value less than 5%, the null hypothesis can be rejected. The outcome of the Levin-Lin-Chu unit-root test for panel data in table 4.2 shows a p-value of 0.000< 0.05, which implies that all the variables are not stationary at level. Since the variables are not stationary, they are therefore transformed by taking their natural logarithm before fitting the panel regression for optimal model parameter estimation.

Table 4. Test of Multicollinearity Result

| Model | | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| 1 | CCC | 0.989 | 1.011 |
| | WCIP | 0.990 | 1.010 |
| | WCFP | 0.995 | 1.005 |
| | AGE | 0.970 | 1.031 |
| | FS | 0.967 | 1.034 |
| | Lev | 0.998 | 1.002 |

a. Dependent Variable: ROCE

From the multicollinearity test shown in Table 4.4, it was observed that all the variables return a low VIF value that does not exceed the minimum condition (>5) for no collinearity stated by the VIF. This implies that the variables do not collinear, the Panel data Regression (Generalized Least Square GLS) model can be applied with an expectation of a robust inference since the multicollinearity assumption is not violated.

Table 5. Hausman Test for Model Selection

| | Coefficients (b) fixed | (B) random | (b-B) Difference | sqrt(diag(V_b-V_B)) S.E. |
|---|---|---|---|---|
| CCC | .0032063 | .0032124 | -6.05e-06 | 7.15e-06 |
| WCIP | .0024905 | .0025067 | -.0000162 | .0000162 |
| WCFP | -.0000568 | -.000054 | -2.76e-06 | .0000195 |
| AGE | -.0000775 | -.0000867 | 9.18e-06 | 7.60e-06 |
| FS | -.0000882 | -.0001109 | .0000227 | .000048 |
| Lev | -1.077925 | -1.077709 | -.000216 | .000498 |
| SEC | | | | |
| 2 | -.0152031 | -.0147059 | -.0004973 | .0009648 |
| 3 | .0018534 | .0024912 | -.0006378 | .0010771 |
| 4 | .0170896 | .0174744 | -.0003848 | .0007584 |
| 5 | .0083269 | .0090501 | -.0007232 | .0007964 |
| 6 | -.0336343 | -.0336835 | .0000492 | .0008322 |
| 7 | .0064129 | .0069812 | -.0005683 | .0007539 |
| 8 | -.0057502 | -.0048345 | -.0009157 | .0007928 |
| 9 | -.0072367 | -.0062986 | -.0009382 | .0010702 |
| 10 | .0078328 | .0086757 | -.0008429 | .0008119 |

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(15) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 8.53
Prob>chi2 = 0.9009

As observed from the Hausman test p-value (0.9009) which is greater than the 0.05 (5%) level of significance, which in turn implies that the random effect model is the most appropriate and thus better than both the Pooled OLS and the fixed Effect model. Therefore, this study will be based on it for the test of hypothesis with ROCE as the dependent variable.

Table 6. Model Parameter Estimate

| ROCE | Random Effect Model | | Fixed Effect Model | |
|---|---|---|---|---|
| | Coef. | P>\|z\| | Coef. | P>\|t\| |
| CCC | 0.0032124 | 0.000 | 0.0032063 | 0.000 |
| WCIP | 0.0025067 | 0.000 | 0.0024905 | 0.000 |
| WCFP | -0.000054 | 0.852 | -0.0000568 | 0.845 |
| AGE | -0.0000867 | 0.359 | -0.0000775 | 0.414 |
| FS | -0.0001109 | 0.865 | -0.0000882 | 0.893 |
| Lev | -1.077709 | 0.000 | -1.077925 | 0.000 |
| SEC | | | | |
| Conglomerates | -0.0147059 | 0.271 | -0.0152031 | 0.257 |
| Construction/Real Estates | 0.0024912 | 0.840 | 0.0018534 | 0.881 |
| Consumer Goods | 0.0174744 | 0.093 | 0.0170896 | 0.101 |
| Healthcare | 0.0090501 | 0.427 | 0.0083269 | 0.466 |
| Ict | -0.0336835 | 0.003 | -0.0336343 | 0.003 |
| Industrial Goods | 0.0069812 | 0.513 | 0.0064129 | 0.549 |
| Oil And Gas | -0.0048345 | 0.657 | -0.0057502 | 0.598 |
| Natural Resources | -0.0062986 | 0.649 | -0.0072367 | 0.603 |
| Services | 0.0086757 | 0.393 | 0.0078328 | 0.442 |
| _cons | 1.221939 | 0.000 | 1.22195 | 0.000 |
| Number of groups | 109 | | 109 | |
| Number of obs | 1,090 | | 1,090 | |
| F(15, 1074) | 24165.98 | | 1604.72 | |
| Prob > F | 0.000 | | 0.000 | |
| R-squared | 0.7975 | | 0.7974 | |
| Adj R-squared | NA | | NA | |
| Root MSE | NA | | NA | |

**Discussion of Findings**

As seen from the table 6 above, the variable Cash Conversion Cycle (CCC) has a coefficient of 0.0032124. This implies that the Cash Conversion Cycle (CCC) has a positive impact on the return on capital employed (ROCE) as a measure of the corporate profitability of the firms. This, suggests that with a percentage increase in the Cash Conversion Cycle (CCC) of the selected non-financial firm could result in about a 0.0032124-unit increase in profitability as explained by their ROCE. However, Cash Conversion Cycle (CCC) has a p-value of 0.0000 which is less than the 0.05 (5%) level of significance which implies that the coefficient is statistically significant. Hence, the null hypothesis is rejected. We, therefore, conclude that the relationship observed between the Cash Conversion Cycle (CCC) and the return on capital employed is generalisable.

Contrary to [51] that changes in the CCC metric are not related to changes in company performance and also [25], [26], [47]and [37] who also found that cash conversion cycle and its components have no major impact on profitability; the inference from hypothesis one is consistent with previous studies that there is likely to be a strong link between CCC and profitability [41], [42] and that the CCC is the central theory and dynamic indicator of working capital management and is a very crucial component of WCM as it directly affects the liquidity and profitability of the firm [22], [39]. It agrees with

[14] and [15]; [4]; [18] whose results highlighted a positive and significant effect of CCC on profitability.

The Working Capital Investment Policy (WCIP) has a panel regression coefficient of 0.0025067 which implies that WCIP has a positive impact on the firms' ROCE as a measure of profitability. Thus, suggesting that a unit increase in the WCIP will result in about a 0.0025067-unit increase in its profitability as explained by its return on capital employed, which is also seen to be significant since the p-value 0.000 is less than the 5% level of significance. Hence, the null hypothesis is rejected. We, therefore, conclude that there is a significant and generalizable impact of the Working Capital Investment Policy (WCFP) on the firms' return on capital employed (ROCE) as a measure of corporate profitability.

A conservative approach are posited to come with low risk and low return [14] and [15which does not align with the positive relationship inferred from this estimation. But it is consistent with [16], [17] and [18] who posited positive significant relationships. Which is contrary to [20] who submitted that working capital investment does not predict the profitability.

The variable Working Capital Financing Policy (WCFP) has a panel regression coefficient of -0.00054 which implies that the Working Capital Financing Policy (WCFP) has a negative impact on the firms' return on capital employed (ROCE) as a measure of corporate profitability. Thus, suggesting that a percentage increase in the WCFP of the firm will cause approximately -0.00054-unit decrease in its performance as explained by its ROCE however, not statistically significant. Hence, the null hypothesis is not rejected. We, therefore, conclude that there is no significant and generalisable impact of the Working Capital Financial Policy on the return on capital employed as a measure of profitability.

This result agrees with studies by [10] and [52] who posited that financing policy does not have any significant impact on profitability, which infers that being aggressive in working capital financing policy may not be able to improve its profitability. There could be varying influence depending on the industry as posited by Ajaya and Swagatika (2018) who indicated that WCF had a convex relationship with profitability for firms in the chemical, construction and consumer goods sector but a concave relationship was observed for textile, metal and machinery sector. However the findings is not consistent with findings by [53] and [54] which found WCFP to have a significant effect on profitability and that following a conservative financing policy by using more long-term debt to fund the company's operating activities has a positive effect on company profitability and [55] that firm performance is enhanced/reduced with a reduction/increase in working capital financing through short term debt.

Control Variables: The firms' age, size and leverage are used as control variables to mediate the effect of WCM and WCP on firms' corporate profitability. The firm age, and firm size return with negative coefficients and p-values of 0.359 and 0.865 respectively which are greater than 0.05 (5%) when modelled with ROCE as a dependent variable; this shows both firm age and size not to have a significant controlling effect on the relationship observed between ROCE and WCM/WCP. Conversely, leverage returned with a p-value of 0.000 which is less than 0.05 (5%), implies that it has a significant effect on the relationship observed between ROCE and WCM/WCP but the negative type.

Controlling effect of the Sector as Dummy: The sector dummy was plugged into the model to check if the distinct nature and varying operational procedures and different working capital requirements of each sector could influence the outcome of this study, thus making the observed relationship between WCM/WCP and the firms' profitability sector biased. The results are contained in the overall estimated panel regression model for ROCE in Tables 4.4.

It was observed that only the ICT sector with a p-value of 0.003 which is less than 0.05(5%) is significant when estimated with the ROCE model. This indicates that the effect of working capital management and policy on corporate profitability measured by ROCE is biased to the ICT sector because the ICT sector influences its outcome.

# 4 Conclusion

This study has been able to analyze the nexus between working capital management, working capital policy and the corporate profitability of all 109 listed non-financial firms in Nigeria as a whole and per sector to determine the individual influence of each sector. In conclusion, with regards to the general objective of this study, there is an observed positive and significant Impact of working capital management proxied by CCC and working capital investment policy on return on capital employed of listed non-financial firms in Nigeria. While working capital financing policy has a negative but not significant effect on return on capital employed of

listed non-financial firms in Nigeria. Also, only leverage as a control variable had an effect on ROCE while firm size and firm age had no effect. Furthermore, the outcome of the effect of WCM and WCP on Return on Capital Employed (ROCE) is biased to the ICT sector because the ICT sector influences its outcome.

From the findings and conclusion drawn from this study, the researcher recommends thus:

- Listed companies should take advantage of the effect CCC has on ROCE by paying attention to the three components that make up CCC: Inventory period accounts receivable period and accounts payable period. CCC should be kept in a well-controlled and reasonable period as the level of impact achievable is based on management strategy.
- As seen from the results of this study, if firms invest more in current assets their profit will be significantly affected. Managers should however put into account the nature of their business and identify the optimal level that brings the highest return as the associated cost of holding current assets may outweigh the gain later.
- This study has shown that WCFP is insignificant in predicting the profitability of listed non-financial firms in Nigeria should therefore be consistent in managing the level of its working capital such that there is not too much available cash which can lose its value in harsh economic conditions and there is no shortage of cash flow that can make the firm seek additional long-term debts under unfavorable conditions.

*References:*

[1] W. Wu, J. C.-B. technology, and undefined 2019, "Integrated algal biorefineries from process systems engineering aspects: A review," *Elsevier*, Accessed: May 05, 2022. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0960852419311691

[2] M. Salehi, N. Mahdavi, S. Zarif Agahi Dari, and H. Tarighi, "Association between the availability of financial resources and working capital management with stock surplus returns in Iran," *Int. J. Emerg. Mark.*, vol. 14, no. 2, pp. 343–361, Mar. 2019, doi: 10.1108/IJOEM-11-2017-0439/FULL/HTML.

[3] P. EGOLUM and E. UROM, "CASH CONVERSION CYCLE AND FIRM PERFORMANCE NEXUS: EVIDENCE FROM LISTED NON-FINANCIAL COMPANIES IN NIGERIA," *researchgate.net*, Accessed: May 05, 2022. [Online]. Available: https://www.researchgate.net/profile/Egolum-Uche-2/publication/354402231_CASH_CONVERSION_CYCLE_AND_FIRM_PERFORMANCE_NEXUS_EVIDENCE_FROM_LISTED_NON-FINANCIAL_COMPANIES_IN_NIGERIA/links/6137123cc69a4e4879845731/CASH-CONVERSION-CYCLE-AND-FIRM-PERFORMANCE-NEXUS-EVIDENCE-FROM-LISTED-NON-FINANCIAL-COMPANIES-IN-NIGERIA.pdf

[4] M. A. Q. Aldubhani, J. Wang, T. Gong, and R. A. Maudhah, "Impact of working capital management on profitability: evidence from listed companies in Qatar," *J. Money Bus.*, Mar. 2022, doi: 10.1108/JMB-08-2021-0032/FULL/HTML.

[5] F. Onyango, S. N.-I. J. of E. and Finance, and undefined 2018, "Influence of Working Capital Management on Financial Distress In Hospitality Industry (A Study Of Four And Five Star Hotels In Nairobi County)," *academia.edu*, vol. 9, no. 3, pp. 52–59, doi: 10.9790/5933-0903025259.

[6] A. Akgün, A. K.-I. J. of M. Finance, and undefined 2020, "Investigating the relationship between working capital management and business performance: Evidence from the 2008 financial crisis of EU-28," *emerald.com*, Accessed: May 05, 2022. [Online]. Available: https://www.emerald.com/insight/content/doi/10.1108/IJMF-08-2019-0294/full/html?utm_source=rss&utm_medium=feed&utm_campaign=rss_journalLatest

[7] A. Akbar, M. Akbar, M. Nazir, P. Poulova, S. R.-Risks, and undefined 2021, "Does Working Capital Management Influence Operating and Market Risk of Firms?," *mdpi.com*, 2021, doi: 10.3390/risks9110201.

[8] M. Akbar, A. Akbar, M. D.-S. Open, and undefined 2021, "Global financial crisis, working capital management, and firm performance: evidence from an Islamic market index," *journals.sagepub.com*, vol. 11, no. 2, 2021, doi: 10.1177/21582440211015705.

[9] A. T. H. Nguyen and T. Van Nguyen, "Working capital management and corporate profitability: Empirical evidence from Vietnam," *Found. Manag.*, vol. 10, no. 1, pp. 195–206, 2018, doi: 10.2478/FMAN-2018-0015.

[10] S. Sunardi, A. Ayuk, P. Pertiwi, and S. Supramono, "Conservative Working Capital Policy: Can it Increase Profitability and Sustainable Growth Rate?," *turcomat.org*, vol. 12, no. 3, pp. 5630–5637, 2021, Accessed: May 05, 2022. [Online]. Available: https://www.turcomat.org/index.php/turkbilmat/article/view/2237

[11] A. S. Alarussi and S. M. Alhaderi, "Factors affecting profitability in Malaysia," *J. Econ. Stud.*, vol. 45, no. 3, pp. 442–458, Aug. 2018, doi: 10.1108/JES-05-2017-0124/FULL/HTML.

[12] N. Mabandla, P. M.-A. of A. and Financial, and undefined 2019, "Working capital management and financial performance: evidence from listed

food and beverage companies in South Africa," *researchgate.net*, Accessed: May 05, 2022. [Online]. Available: https://www.researchgate.net/profile/Patricia-Makoni-3/publication/354896762_working_capital_management_and_financial_performance_evidence_from_listed_food_and_beverage_companies_in_south_africa/links/61533465522ef665fb6a9ab9/WORKING-CAPITAL-MANAGEMENT-AND-FINANCIAL-PERFORMANCE-EVIDENCE-FROM-LISTED-FOOD-AND-BEVERAGE-COMPANIES-IN-SOUTH-AFRICA.pdf

[13] A. Basyith, A. Djazuli, F. F.-A. E. and Financial, and undefined 2021, "Does working capital management affect profitability? empirical evidence from indonesia listed firms," *archive.aessweb.com*, 2021, doi: 10.18488/journal.aefr.2021.113.236.251.

[14] F. S.-J. of applied accounting and taxation and undefined 2018, "Effect of cash conversion cycle, firm size, and firm age to profitability," *103.209.1.42*, Accessed: May 05, 2022. [Online]. Available: https://103.209.1.42/index.php/JAAT/article/view/674

[15] K. Amponsah-Kwatiah, M. A. P. Management, and undefined 2020, "Working capital management and profitability of listed manufacturing firms in Ghana," *emerald.com*, Accessed: May 05, 2022. [Online]. Available: https://www.emerald.com/insight/content/doi/10.1108/IJPPM-02-2020-0043/full/html?utm_source=rss&utm_medium=feed&utm_campaign=rss_journalLatest

[16] K. Amponsah-Kwatiah and M. Asiamah, "Working capital management and profitability of listed manufacturing firms in Ghana," *Int. J. Product. Perform. Manag.*, 2020, doi: 10.1108/IJPPM-02-2020-0043/FULL/HTML.

[17] S. Hernandez, D. Migliaro, P. Suarezm, and A. Arnaldi, "Working Capital Determinants and Profitability: Empirical Evidence from an Emergent Economy," *IAR J. Bus. Manag.*, vol. 2, no. 2, 2021.

[18] F. W.-E. R. International and undefined 2021, "Working Capital Management and Its Impact on Firms' Performance: An Empirical Analysis on Ethiopian Exporters," *hindawi.com*, Accessed: May 05, 2022. [Online]. Available: https://www.hindawi.com/journals/edri/2021/6681572/

[19] S. Raharja, N. K.-R. of I. B. and, and undefined 2019, "Impact of Profitability on the Growth of Small and Medium Enterprises in the Culinary Sub-sector of the Creative Industry in Bandung City, Indonesia," *sibresearch.org*, Accessed: May 05, 2022. [Online]. Available: http://sibresearch.org/uploads/3/4/0/9/34097180/riber_8-s4_05_h18-153_75-81.pdf

[20] I. Dalci, H. O.-H. Policy, and undefined 2018, "Working capital management policy in health care: The effect of leverage," *Elsevier*, Accessed: May 05, 2022. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S016885101830513X

[21] A. Rizky, M. Mayasari, J. M. Bisnis, and N. Batam, "The Impact of Cash Conversion Cycle on Firm Profitability of Retail Companies," *jurnal.polibatam.ac.id*, vol. 3, no. 1, pp. 73–78, 2018, Accessed: May 05, 2022. [Online]. Available: https://jurnal.polibatam.ac.id/index.php/JAAT/article/view/679

[22] N. Linh, S. M.-A. J. of B. and, and undefined 2018, "The effects of cash conversion cycle on profitability: An insight into the agriculture and food industries in Thailand," *ejournal.um.edu.my*, vol. 11, no. 1, 2018, Accessed: May 05, 2022. [Online]. Available: https://ejournal.um.edu.my/index.php/AJBA/article/view/12148

[23] A. M. I. Jariya, "Cash conversion cycle and firms' profitability–a study of listed beverage, food and tobacco companies of Sri Lanka.," *J. Manage.*, vol. 14, no. 2, 2019, Accessed: May 05, 2022. [Online]. Available: http://192.248.66.13/handle/123456789/3765

[24] L. Awopetu, P. Wui, and J. Park, "Working Capital Investing Policy under Economic Recession Focusing on Small-medium Size Companies," *Int. Rev. Bus. Res. Pap.*, vol. 13, no. 1, pp. 17–30, 2017.

[25] O. EL-Ansary and H. Al-Gazzar, "Working capital and financial performance in MENA region," *J. Humanit. Appl. Soc. Sci.*, vol. 3, no. 4, pp. 257–280, Aug. 2021, doi: 10.1108/JHASS-02-2020-0036/FULL/HTML.

[26] N. Alsulayhim and N. A. Alsulayhim, "The relationship between working capital management and profitability," *Int. Bus. Res.*, vol. 12, no. 8, 2019, doi: 10.5539/ibr.v12n8p142.

[27] L. Zhao and A. Huchzermeier, "Supply Chain Finance," *EURO Adv. Tutorials Oper. Res.*, pp. 105–119, 2018, doi: 10.1007/978-3-319-76663-8_6.

[28] J. Mbawuni, M. H. Mbawuni, and S. G. Nimako, "The Impact of Working Capital Management on Profitability of Petroleum Retail Firms: Empirical Evidence from Ghana," *Int. J. Econ. Financ.*, vol. 8, no. 6, 2016, doi: 10.5539/ijef.v8n6p49.

[29] K. Shuaibu, I. Ali, I. A.-J. of R. in H. and, and undefined 2019, "Company attributes and firm value of listed consumer goods companies in Nigeria," *researchgate.net*, vol. 7, no. 5, pp. 2321–9467, 2019, Accessed: May 05, 2022. [Online]. Available: https://www.researchgate.net/profile/Kabiru-Shuaibu/publication/348659144_Company_Attributes_and_Firm_Value_of_Listed_Consumer_Goo

ds_Companies_in_Nigeria/links/600991b045851553a05c21fe/Company-Attributes-and-Firm-Value-of-Listed-Consumer-Goods-Companies-in-Nigeria.pdf

[30] K. Shuaibu, A. Muhammad, and U. Isah, "Cash Conversion Cycle and Profitability of Listed Cement Companies in Nigeria," *researchgate.net*, vol. 2, no. 1, pp. 2756–4932, Accessed: May 05, 2022. [Online]. Available: https://www.researchgate.net/profile/Kabiru-Shuaibu/publication/348961838_Cash_Conversion_Cycle_and_Profitability_of_Listed_Cement_Companies_in_Nigeria/links/60193338299bf1b33e40819c/Cash-Conversion-Cycle-and-Profitability-of-Listed-Cement-Companies-in-Nigeria.pdf

[31] E. Oseifuah, A. G.-A. and Management, and undefined 2018, "Effect of Global Financial Crisis on Firm Value: Evidence from JSE Listed Non-Financial Firms," *journals.univ-danubius.ro*, 2019, doi: 10.3846/btp.2019.06.

[32] E. O.-A. of E. journal and undefined 2018, "Global financial crisis, working capital management and profitability of non-financial firms listed on the Johannesburg Stock Exchange, South Africa," *search.proquest.com*, Accessed: May 05, 2022. [Online]. Available: https://search.proquest.com/openview/8b2eac208f09a7bc2c5667d5633fd9fc/1?pq-origsite=gscholar&cbl=29726

[33] A. Otekunrin, T. Nwanji, G. F.-… in Management, and undefined 2021, "Does working capital management impact an enterprise's profitability? Evidence from selected Nigerian firms," *researchgate.net*, doi: 10.21511/ppm.19(1).2021.40.

[34] K. Said, … Y. D.-J. of A. M. and, and undefined 2021, "Strategies to Improve Financial Profitability in the Banking Industry," *scholarworks.waldenu.edu*, vol. 20, no. 1, pp. 52–70, 2021, doi: 10.5590/IJAMT.2021.20.1.03.

[35] U. Ibrahim, A. I.-I. J. of R. in Business, and undefined 2021, "Working capital management and financial performance of non financial quoted companies in Nigeria," *ssbfnet.com*, 2021, doi: 10.20525/ijrbs.v10i3.1116.

[36] "EconPapers: Financial constraints and optimal working capital – evidence from an emerging market." https://econpapers.repec.org/article/emeijmfpp/ijmf-07-2016-0131.htm (accessed May 05, 2022).

[37] I. Yilmaz, G. A.-J. of Economics, M. and, and undefined 2019, "The effect of cash conversion cycle on profitability in Omani companies," *journals.iium.edu.my*, vol. 27, no. 2, pp. 269–290, 2019, Accessed: May 05, 2022. [Online]. Available: https://journals.iium.edu.my/enmjournal/index.php/enmj/article/view/654

[38] - Nusrat and □□ J., "An Empirical Investigation of Cash Conversion Cycle of Manufacturing Firms and its Association with Firm Size and Profitability," pp. 18–32, 2020, Accessed: May 05, 2022. [Online]. Available: https://arxiv.org/abs/2005.09482v1

[39] opusunju micheal isaac, O. Augustine Olorunfemi, M. Isaac, and N. Santeli, "EFFECT OF CASH CONVERSION CYCLE (CCC) PERIOD ON THE PROFITABILITY OF SELECTED FOOD AND BEVERAGE COMPANIES IN NIGERIA," *academia.edu*, 2020, Accessed: May 05, 2022. [Online]. Available: https://www.academia.edu/download/63071850/cash_con20200423-20879-z493ko.pdf

[40] F. Mahmood, D. Han, N. Ali, R. Mubeen, U. S.-Sustainability, and undefined 2019, "Moderating effects of firm size and leverage on the working capital finance–profitability relationship: evidence from China," *mdpi.com*, doi: 10.3390/su11072029.

[41] J. Kwadwo Tuffour *et al.*, "Life Insurance Companies: Determinants of Cost Efficiency and Profitability," *journal.stie-mce.ac.id*, vol. 28, no. 2, pp. 1–19, 2021, Accessed: May 05, 2022. [Online]. Available: http://journal.stie-mce.ac.id/index.php/jabminternational/article/view/501

[42] J. K. Tuffour, K. O.-B.-… & Management, and undefined 2021, "Life Insurance Companies: Determinants of Cost Efficiency and Profitability.," *search.ebscohost.com*, Accessed: May 05, 2022. [Online]. Available: http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=0216423X&AN=153515662&h=MSgd8Nj2jJtm5rFwQfxOx2KqfUVFyLPQ2bGKlK%2B1brGEfkJ7%2Fp%2Byu15a8ASX0mQzgx81B2ibcOu4PlylOVqzgg%3D%3D&crl=c

[43] S. Abdullah, D. S. Siddiqui, D. (2019). W. Capital, and undefined 2019, "Working capital financing and corporate profitability of Pakistan manufacturing firms: Evidence from FMCG, cement & chemical sector," *papers.ssrn.com*, 2019, doi: 10.18488/journal.8.2019.72.82.94.

[44] H. Lahore, N. N.-P. J. of A. of Egypt, and undefined 2020, "THE IMPACT OF SOCIO-CULTURAL AND DEMOGRAPHICS FACTORS ON RELIGIOUS INTOLERANCE IN PAKISTAN," *archives.palarch.nl*, Accessed: May 05, 2022. [Online]. Available: https://www.archives.palarch.nl/index.php/jae/article/view/6431

[45] N. Farhan, F. Belhaj, W. A.-… & Management, and undefined 2021, "An analysis of working capital management in India: An urgent need to refocus," *Taylor Fr.*, vol. 8, no. 1, 2021, doi: 10.1080/23311975.2021.1924930.

[46] N. H. S. Farhan *et al.*, "Working Capital Management Policies in Indian Listed Firms: A State-Wise Analysis," *mdpi.com*, 2021, doi: 10.3390/su13084516.

[47] G. Ullah, A. Zahid, I. Khan, … M. I.-J. of M., and undefined 2018, "Working capital management and SME profitability: Empirical evidence from Bangladesh," *papers.ssrn.com*, 2018, Accessed: May 05, 2022. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3299586

[48] T. Hiestand, "Using Pooled Model, Random Model And Fixed Model Multiple Regression To Measure Foreign Direct Investment In Taiwan," *Int. Bus. Econ. Res. J.*, vol. 4, no. 12, 2011, doi: 10.19030/iber.v4i12.3642.

[49] N. Nofianti *et al.*, "The role of ownership's concentration moderating dividend policy effects on firm value," *academia.edu*, vol. VIII, no. 2, pp. 126–135, 2020, Accessed: May 05, 2022. [Online]. Available: https://www.academia.edu/download/72206950/download.pdf

[50] A. K. Manik, J. Nugroho, and A. Zainudin, "Pengaruh Working Capital Turnover dan Debt To Asset Ratio Terhadap Return On Assets Pada PT Kalbe Farma Tbk Periode Tahun 2010–2019," *HUMANIS (Humanities, Manag. Sci. Proceedings)*, vol. 1, no. 2, 2021.

[51] T. De Magíster En, G. Financiera, Q. Maldonado, and B. Elizabeth, "La gestión financiera de corto plazo y el efecto en la rentabilidad de las empresas ecuatorianas del sector transporte y almacenamiento durante el período 2012-2016," 2018, Accessed: May 05, 2022. [Online]. Available: http://dspace.utpl.edu.ec/handle/20.500.11962/22655

[52] N. Putu, S. Dinda Pradnyadari, A. A. Ngurah, and B. Dwirandra, "The Effect of Working Capital Policy on Financial Performance of LQ45 Companies on the IDX 2017-2019," *ajhssr.com*, no. 5, pp. 209–214, Accessed: May 05, 2022. [Online]. Available: https://www.ajhssr.com/wp-content/uploads/2021/04/ZA2154209214.pdf

[53] S. Almerri and S. K. Al-Okdeh, "The Impact of Working Capital Management Policies on Financial Performance of Mining and Extraction Companies Listed on Amman Stock Exchange," *ijicc.net*, vol. 14, no. 2, p. 2020, Accessed: May 05, 2022. [Online]. Available: https://www.ijicc.net/images/Vol_14/Iss_2/14239_Almerri_2020_E_R.pdf

[54] B. Cornelius, S. J.-J. Riset, and undefined 2021, "THE EFFECT OF MANAGEMENT AND WORKING CAPITAL POLICIES ON THE PROFITABILITY OF MANUFACTURING COMPANIES LISTED IN INDONESIA STOCK," *ejurnal.mercubuana-yogya.ac.id*, no. 1, 2021, Accessed: May 05, 2022. [Online]. Available: http://ejurnal.mercubuana-yogya.ac.id/index.php/akuntansi/article/view/1418/0

[55] N. Altaf, "Working Capital Financing, Firm Performance and Financial Flexibility: Evidence from Indian Hospitality Firms," *Glob. Bus. Rev.*, 2020, doi: 10.1177/0972150920961371.

## Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

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## Authors' Declarations

The Authors have no conflict of interests to declare.

## Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

This research received no specific grant from any funding agency in the public, commercial, or non-for-profit sectors.