EFFECT OF CASH CONVERSION CYCLE ON PROFITABILITY OF QUOTED MANUFACTURING FIRMS IN NIGERIA

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IJMSSSR 2022
VOLUME 4
ISSUE 1 JANUARY - FEBRUARY **ISSN: 2582 - 0265**

Abstract: This study ascertained the nexus between Cash Conversion Cycle and Profitability of quoted Manufacturing Firms in Nigeria from 2008-2020. Specifically, this study determined the relationship between Inventory Turnover Period, Average Collection Period, Average Payment Period and Profit after Tax. Panel data were used in this study, which were obtained from the annual reports and accounts of twenty one (21) sampled manufacturing firms for the periods 2008-2020. *Ex-Post Facto* research design was employed. Inferential statistics using Pearson correlation coefficient, Multicollinearity test, Panel least square regression analysis and Hausman test were applied to test the hypotheses of the study. The results showed that there is a significant and positive relationship between Inventory Turnover Period, Average Collection Period, Average Payment Period and Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance respectively. The study recommended inter alia that firms should paying attention to proper inventory management by setting standard that will help to maintain inventory at optimal level.

Keywords: Inventory Turnover Period, Average Collection Period, Average Payment Period, Profit after Tax

Background to the Study

Working capital management refers to the management of current assets and current liabilities of a firm in order to achieve a balance between profitability and risk that contributes positively to the value of a firm. One of the popular and powerful measures of working capital management is Cash Conversion Cycle. Firm's typically follow a cycle, in which they purchase inventory, sell goods on credit and then collect accounts receivables. This cycle is referred to as Cash Conversion Cycle. Therefore, the Cash Conversion Cycle can be defined as the length of time between the firm's actual cash expenditures to pay for raw materials and its own cash receipts from the sale of finished goods. Thus the Cash Conversion Cycle equals the average length of time a naira s tied up in current assets. Therefore, it is evident that Cash Conversion Cycle focuses only on the time period for which cash flow is engaged in the cycle and does not consider the amount of fund committed to a product as it moves through the Cash Conversion Cycle (Amahalu & Ezechukwu, 2017). The cash conversion cycle (CCC) is equal to the duration the inventory is sold and the time it takes until accumulated releases for the company's payout. The cash conversion cycle, in other terms, is the resultant production of three elements, most importantly the company account receivable in days, including inventory turnover in days, subtracting payable turnover in days. This indicates the days in which the cash of a company is tied up in the business process.

Profitability and liquidity are two considered subjects by companies' analysts and financial managers. And investors use profit as a criterion for evaluating company's function and use liquidity as criterion for company ability for paying debts, stock dividend distribution and company financial flexibility. Liquidity is a prerequisite that ensure that company is able to meet necessities and actually announce continual course in basis of continuation of company work. That is if a company is not profitable, it is sick and if it has no liquidity, it is amort. Cash is considered as one of the most important current assets for companies' desired function and activity continuation and durability of an industrial unit mostly depend on cash turnover (Amahalu, Obi, Abiahu & Ezechukwu, 2017).

The cash management policies of commercial enterprises involve establishing optimal levels of accounts payable, inventory and accounts receivable by considering the economic trade-offs that exist with respect to them. The effectiveness of the firm in managing these accounts can therefore be assessed by evaluating the length of its cash cycle, which reflects on average, the length of time the firm's cash is invested in inventory and receivables. It is

against this backdrop that this study sought to ascertain the effect of Cash Conversion Cycle on Profitability of quoted Manufacturing Firms in Nigeria.

Statement of the Problem

Profit and sale maximization remain the major objectives of any business the world over, and as such, they serve as important yardsticks for measuring the performance of companies. While being liquid is of paramount importance; profitability which is the firm's ultimate objective cannot be achieved without liquidity. Consequently, companies tend to encounter difficulties in establishing and maintaining an appropriate balance between the unseparated twins: liquidity-profitability. Maintaining a balance between the two is a concept that requires a pragmatic approach and sufficient attention. There should be equilibrium between company's liquidity and profitability in order to avoid crisis, bankruptcy and insolvency as the consequence of inappropriate balance between the two. To achieve this equilibrium, the components of the cash conversion cycle (Inventory Turnover Period, Average Collection Period and Average Payment Period) should be properly managed.

Existing studies on the relationship between cash conversion cycle and profitability has not reached a consensus. The result of the extant reviewed literatures holds divergent views ranging from positive relationship to negative and non significant relationship, for instance, Hussain, Hassan, Abul-Quddus, & Nguyen (2021); Amahalu, Egolum, Ezechukwu and Obi (2018) found a significant and positive relationship between cash conversion cycle and profitability. On the other hand, a negative relationship was found by Xuan, Nguyen and Nguyen (2020), while, Sawarni, Narayanasamy and Ayyalusamy (2020) reported a non-significant relationship. The lack of a general agreement regarding the influence that cash conversion cycle variables have on corporate profitability led to a gap in knowledge which this study sought to fill.

Objectives of the Study

The main objective of this study is to empirically evaluate the relationship between Cash Conversion Cycle and Profitability of quoted Manufacturing Firms in Nigeria.

The specific objectives of this study are to:

i. Ascertain the extent of relationship between Inventory Turnover Period and Profit after Tax of quoted Manufacturing Firms in Nigeria.

ii. Determine the magnitude of relationship between Average Collection Period and Profit after Tax of quoted Manufacturing Firms in Nigeria.

iii. Assess the degree of relationship between Average Payment Period and Profit after Tax of quoted Manufacturing Firms in Nigeria.

Research Hypotheses

In order to achieve the stated objectives, the following null hypotheses were formulated:

Ho_1: There is no significant relationship between Inventory Turnover Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

Ho_2: There is no significant relationship between Average Collection Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

Ho_3: There is no significant relationship between Average Payment Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

Conceptual Review

Cash Conversion Cycle (CCC)

Cash conversion cycle (CCC) is the length of time from the actual outlay of cash for purchases until the collection of receivables resulting from the sale of goods and services. CCC is the average days required to turn a dollar invested in raw material into a dollar collected from a customer. Iqbal, Gan and Nadeem (2020) defined cash conversion cycle as a measure of the number of days the firm's operating cycle requires costly financing to support it. Cash conversion cycle is the number of days between accounts payable and accounts receivable. Cash conversion cycle is the sum of days sales outstanding (average collection period) and the days of sales in inventory less days of payables outstanding.. Cash cycle components includes: average age of inventory, average collection period of accounts receivable and, average payment period of accounts payable. Calculating the cash cycle requires determining the number of days cash is invested in each of the cash cycle components

Inventory Turnover Period (ITP)

Inventory turnover is a ratio showing how many times a company's inventory is sold and replaced over a period of time (Amahalu, Nweze & Obi, 2017). The days in the period can then be divided by the inventory turnover formula to calculate the days it takes to sell the inventory on hand. Inventory turnover measures how fast a company is selling inventory and is generally compared against industry averages. A low turnover implies weak sales and, therefore, excess inventory. A high ratio implies either strong sales and/or large discounts.

$$ITP = \frac{\text{Average Inventory}}{\text{Cost of Goods Sold}} \times \frac{365\text{days}}{1}$$

Average Collection Period (ACP)

The average collection period ratio, often shortened to "average collection period" is also referred to as the "ratio of days to sales outstanding." It is the average numbers of days it takes a company to collect its accounts receivable. In other words, this financial ratio is the average number of days required to convert receivables into cash.

The formula for calculating the average collection period ratio is:

$$ACP = \frac{\text{Average Accounts Receivable}}{\text{Net Credit Sales}} \times \frac{365\text{days}}{1}$$

Average Payment Period (APP)

Average payment period (APP) is a solvency ratio that measures the average number of days it takes a business to pay its vendors for purchases made on credit. Average payment period is the average amount of time it takes a company to pay off credit accounts payable. Many times, when a business makes a purchase at wholesale or for basic materials, credit arrangements are used for payment. These are simple payment arrangements that give the buyer a certain number of days to pay for the purchase. The average payment period calculation can reveal insight about a company's cash flow and creditworthiness, exposing potential concerns.

$$APP = \frac{\text{Average Accounts Payable}}{\text{Credit Purchases}} \times \frac{365}{1}$$

Profit after Tax

Net profit, also referred to as the bottom line, net income, or net earnings is a measure of the profitability of a venture after accounting for all costs and taxes. It is the actual profit, and includes the operating expenses that are excluded from gross profit. A common synonym for net profit when discussing financial statements (which include a statement of financial position and income statement) is the bottom line. This term results from the traditional appearance of an income statement which shows all allocated revenues and expenses over a specified

time period with the resulting summation on the bottom line of the report (Amahalu & Obi, 2020b). In simplistic terms, net profit is the money left over after paying all the expenses of an endeavor. Profit after tax is the net amount earned by a business after all taxation related expenses have been deducted. The profit after tax is often a better assessment of what a business is really earning and hence can use in its operations than its total revenues.

Inventory Period and Profit after Tax

Ha and Hoang (2020) dealt with investigating relationship between CCC and profitability. Research statistical method was ANOVA and Pierson correlation analysis. Research findings showed that lowest CCC relate to retail industry. And in continuation, a negative relationship has been observed between CCC and profitability. Similarly, Amahalu and Obi (2020a) reported a positive relationship between CCC and profitability. Contrarily, Cheng, Chiao, Fang, Wang and Yao (2019) documented a negative relationship between CCC and profitability.

Average Collection Period and Profit after Tax

Jose, Lancaster and Stevens (2016) investigated the relationship between floating capital and company operation and CCC .In the analysis, 5802 accepted companies in New York Stock Exchange have been used as sample. Results implied that companies' profitability and operational cash are increasing through shortening CCC and shortening receivable accounts receipt period. Also results showed that shortening stock conversion period and increasing payable accounts period decrease profitability and operational cash flow while Kabuye, Kato, Akugizibwe and Bugambiro, (2019) found a non-significant relationship between between CCC and profitability.

Average Payment Period and Profit after Tax

Moss and Stine (2017) investigated stock companies' profitability and cash conversion cycle. A sample of 131 companies that have been accepted in Athens Exchange was used. Results of time period 2001-2004 showed that there is a meaningful relationship between company profitability (that has been calculated by operational profit) and CCC and managers can make profit for company through controlling CCC and its elements. Also, Amahalu, Egolum, Ezechukwu & Obi (2018),;Goncalves, Gaio and Robles (2018) showed the evidence of a positive relationship between CCC and profitability.

Theoretical Framework

Contingency Theory

Developed by Saxberg (1979), Contingency theory of working capital management states that the effectiveness of working capital is highest where the structure fits the contingencies, hence only those organizations that align their working capital with the current environment achieve maximum output. The theory therefore advocates that in determining the level/approach of working capital management to approach, firms must put into consideration the strategically significant external variables such as include economic conditions, demographic trends, sociocultural trends political/legal factors and industry structure (Amahalu, Abiahu, Obi & Nweze, 2018). The theory further notes that there is no level of working capital and is said to be constantly optimal in any particular industry. Rather, given that external factors may change rapidly, managers must constantly adopt their organizations levels and approaches of working capital management to the new situation to ensure effectiveness. The Contingency Theory therefore implicitly treats organizations as loosely coupled aggregates whose separate working capital components may be adjusted or fine-tuned.

Empirical Review

Obalemo, Opusunju and Jiya (2020) examined the effect of the cash conversion cycle (CCC) period on the profitability of selected food and beverage companies in Nigeria. The study used five years period from 2014 to 2018. The study adopted the ex-post facto research design. The population is 43 food and beverage companies listed on the Nigerian stock exchange during the period of study. The study used judgmental sampling techniques to select the sample based on the following criteria and the sample size is ten (10) food and beverage firms in Nigeria. The study used panel regression and analyzed the data using an e-view statistical package of 9.00. The findings indicated that the Cash Conversion Cycle (CCC) has a significant negative relationship with profitability

(measured by ROA). The study also recommended that managers should pay more attention to proper inventory management. This may be achieved by setting certain standards that will help to maintain inventory at the optimal level.

Hussain, Hassan, Abul-Quddus, & Nguyen (2021) used the State Bank of Pakistan data, to examine the direct and moderating role of the exchange rate, effective through the efficient execution of the cash conversion cycle between Pakistani 302 manufacturing companies from 1999–2015. Using the fixed effect as the static panel model and system GMM as a dynamic panel, it was observed that the exchange rate played an authoritative moderating role between the cash conversion cycle and the financial performance. Results of the investigation have shown that in static panel analysis with the cash conversion period, the exchange rate has a positive and substantial moderating effect on return on assets and return on equity whereas that exchange rate has a major negative impact on return on assets and return on equity using dynamic panel data analysis GMM.

Gabriel and Afloarei-Nucu (2021) investigated the relationship between working capital and firm profitability for a sample of 719 Polish listed firms over the period of 2007–2016. The study adopted a quantitative approach using different panel data techniques (ordinary least squares, fixed effects, and panel-corrected standard errors models). The empirical results reported an inverted U-shape relationship between working capital level and firm profitability, meaning that working capital has a positive effect on the profitability of Polish firms to a break-even point (optimum level). After the break-even point, working capital started to negatively affect firm profitability.

Methodology

Research Design

This study employed *Ex-post facto* research design.

Population of the Study

The population of this study consisted of all the sixty (60) quoted manufacturing companies in Nigeria as at 31st December, 2020 (refer to appendix I).

Sample Size and Sampling Technique

Purposive sampling technique was adopted to select twenty one (21) companies with up to date and complete annual reports and accounts for the studied period (2008-2020) (refer to appendix II)

Source of Data

This study basically used secondary data that were extracted from the annual reports and statements of account of the selected manufacturing companies.

Table 1: Variables Definition and Measurement Units

Variable Type	Proxy	Variable Symbols	Variables Explanation
Independent Variable (Cash Conversion Cycle)			
	Inventory Turnover Period	ITP	$\frac{\text{Average Inventory}}{\text{Cost of Goods Sold}} \times \frac{365}{1}$
	Average Collection Period	ACP	$\frac{\text{Average Accounts Receivable}}{\text{Credit Sales}} \times \frac{365}{1}$
	Average Payment Period	APP	$\frac{\text{Average Accounts Payable}}{\text{Credit Purchases}} \times \frac{365}{1}$
Dependent Variable (Profitability)			
	Profit after Tax	PAT	Extracted fom Annual Reports

Control Variables			
	Leverage	LEV	Ratio of Total debt/Total Assets
	Firm Size	FSZ	Natural logarithm of Total Assets

Model Specification

This study adapted the model of Muscettola (2014):
$ROA = \alpha + \beta_1 NDI + \beta_2 NDAP + \beta_3 NDAR + \varepsilon$
Where:
ROA = Return on Assets
NDI = Number of Days Inventory
NDAP = Number of days account payable
NDAR = Number of days accounts receivable:

The following research models were formulated in order to empirically determine the relationship between Cash Conversion Cycle and Profitability based on the objectives of the study:

$PATi,t = \beta_0 + \beta_1 ITP_{i,t} + \beta_2 LEV_{i,t} + \beta_3 FSZ_{i,t} + \varepsilon_{i,t}$ - - - Model 1

$PATi,t = \beta_0 + \beta_1 ACP_{i,t} + \beta_2 LEV_{i,t} + \beta_3 FSZ_{i,t} + \varepsilon_{i,t}$ - - - Model 2

$PATi,t = \beta_0 + \beta_1 APP_{i,t} + \beta_2 LEV_{i,t} + \beta_3 FSZ_{i,t} + \varepsilon_{i,t}$ - - - Model 3

Definition of Variables

β_0 = Intercept coefficient
$\beta_1 - \beta_3$ = Coefficients of independent variables
$PAT_{i,t}$ = Profit after Tax of firm *i* at time *t*
$ITP_{i,t}$ = Inventory Turnover Period of firm *i* at time *t*
$ACP_{i,t}$ = Average Collection Period of firm *i* at time *t*
$APP_{i,t}$ = Average Payment Period of firm *i* at time *t*
$LEV_{i,t}$ = Leverage of firm *i* at time *t*
$FSZ_{i,t}$ = Firm Size of firm *i* at time *t*
$\varepsilon_{i,t}$ = Time varying disturbance term serially uncorrelated with mean zero and variance 1. Random error term for firm *i* at time *t*

Data Presentation and Analysis

Table 2: Pearson Correlation Matrix

	PAT	ITP	ACP	APP	LEV	FSZ
PAT	1.0000					
ITP	-0.2847	1.0000				
ACP	0.3146	-0.1518	1.0000			
APP	0.1643	-0.5065	0.3920	1.0000		
LEV	-0.0310	0.0803	0.1836	-0.1216	1.0000	
FSZ	0.6510	-0.0409	0.5433	-0.0307	-0.0752	1.0000

Source: E-Views 10 Correlation Output, 2021

From the findings on the correlation analysis in table 2, the study found that there was positive correlation coefficient between ACP, APP, FSZ and PAT by correlation factors of 0.3146, 0.1643 and 0.6510 respectively. On the other hand, there is a negative relationship between ITP (-0.2847), LEV (-0.0310) and PAT respectively.

Pre –Estimation Test

Table 3: Test of Multicollinearity

Variance Inflation Factors
Date: 10/04/21 Time: 19:08
Sample: 2008 2020
Included observations: 13

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.006121	340.2508	NA
ITP	8.46E-06	1.902592	1.373339
ACP	0.000719	15.47312	2.208010
APP	0.094251	12.33197	1.903426
LEV	3.53E-06	5.565155	1.194382
FSZ	4.91E-05	339.4644	1.763514

Source: E-Views 10.0 output file, 2020

Table 3 shows that the variance inflation factor (VIF) is less than 10 as revealed by the values of the Centered VIF. This is an indication of non existence of multicollinearity among the variables in the model

Test of Hypotheses

Test of Hypothesis I

Ho_1: There is no significant relationship between Inventory Turnover Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

H_1: There is significant relationship between Inventory Turnover Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

Table 4: Panel Least Square Regression analysis testing the relationship between Inventory Turnover Period and Profit after Tax

Dependent Variable: PAT
Method: Panel Least Squares
Date: 10/04/21 Time: 19:11
Sample: 2008 2020
Periods included: 13
Cross-sections included: 21
Total panel (balanced) observations: 273

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.173342	0.048219	-3.594880	0.0004
ITP	0.062593	0.019543	3.202868	0.0015
LEV	0.006676	0.001548	4.311144	0.0000
FSZ	0.023550	0.004733	4.975811	0.0000
R-squared	0.369903	Mean dependent var		0.094249
Adjusted R-squared	0.310645	S.D. dependent var		0.099337

S.E. of regression	0.091009	Akaike info criterion	-1.941169
Sum squared resid	2.228039	Schwarz criterion	-1.888283
Log likelihood	268.9695	Hannan-Quinn criter.	-1.919939
F-statistic	18.35283	Durbin-Watson stat	1.512077
Prob(F-statistic)	0.000000		

Source: E-Views 10 Regression Output, 2021

Interpretation of Regression Output

Table 4 shows the regression output of the relationship between Inventory Turnover Period and Profit after Tax and the result of the model is written as:

$PAT_{it} = -0.173342 + 0.062593ITP_{it} + 0.006676LEV + 0.023550FSZ + \mu_{it}$

The model infers that 1% increase in ITP will exert 6% increase on PAT; 1% increase in LEV will cause PAT to increase by 0.067%; and an increase in FSZ would equally cause 2% increase on PAT of listed firms in Nigeria. It also shows that ITP (β_1=0.062593); LEV (β_2=0.006676); FSZ (β_3=0.023550) have a positive relationship towards PAT. The slope coefficients reveals that; P(x_1=0.0015<0.05; x_2=0.0000<0.05; x_3=0.0000<0.05). The model delineate that at 95% confidence level, there is a significant positive relationship between ITP, LEV, FSZ and PAT. The Durbin-Watson Value of 1.512077 buttressed the fact that the model does not contain auto-correlation, thereby, making the regression fit for prediction purpose. The adjusted R-Squared of 0.310645 shows that 31% of the systematic variation in PAT could be explained by ITP, LEV and FSZ, while the remaining 69% is explained by the error term as part of the PAT which is not interpreted by the regression model.

Decision

Following the F-statistics of 18.35283 with an associated P-value of 0.000000 (p<0.05) which is less than 5%. Therefore, hypothesis H_1 is accepted while Ho is rejected. Hence, there is a significant relationship between Inventory Turnover Period and Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance.

Table 5 Hausman Test between ITP and PAT

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	30.466609	3	0.0000

Source: E-Views 10, output, 2021

The Hausman test in table 5 indicates that the Chi-Sq. Statistic value of 30.466609 with the p-value of 0.0000 is statistically significant at P-value of 0.05. Invariably, the fixed effect model (FEM) is preferable since the p-value of 0.0000 is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted. Consequently, Inventory Turnover Period has a significant and positive relationship with Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance.

Test of Hypothesis II

Ho_2: There is no significant relationship between Average Collection Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

H_2: There is significant relationship between Average Collection Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

Table 6: Panel Least Square Regression analysis testing the relationship between Average Collection Period and Profit after Tax

Dependent Variable: PAT
Method: Panel Least Squares
Date: 10/05/21 Time: 06:42
Sample: 2008 2020
Periods included: 13
Cross-sections included: 21
Total panel (balanced) observations: 273

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.170505	0.048318	-3.528843	0.0005
ACP	0.262047	0.112326	2.332918	0.0204
LEV	0.006571	0.001531	4.290629	0.0000
FSZ	0.023257	0.004684	4.965253	0.0000

R-squared	0.370591	Mean dependent var	0.094249
Adjusted R-squared	0.361341	S.D. dependent var	0.099337
S.E. of regression	0.090971	Akaike info criterion	-1.941998
Sum squared resid	2.226194	Schwarz criterion	-1.889111
Log likelihood	269.0827	Hannan-Quinn criter.	-1.920768
F-statistic	18.44240	Durbin-Watson stat	1.515741
Prob(F-statistic)	0.000000		

Source: E-Views 10 Regression Output, 2021

Interpretation of Regression Result

Table 6 reveals an adjusted R^2 value of 0.361341. The adjusted R^2, which represents the coefficient of multiple determinations imply that 36.13% of the total variation in the dependent variable (PAT) of listed manufacturing firms in Nigeria is jointly explained by the explanatory variables (ACP, LEV and FSZ). The adjusted R^2 of 36.13% did not constitute a problem to the study because the F- statistics value of 18.44240 with an associated Prob.>F = 0.000000 indicates that the model is fit to explain the relationship expressed in the study model and further suggests that the explanatory variables are properly selected, combined and used. The value of adjusted R^2 of 36.13% also shows that 63.87% of the variation in the dependent variable is explained by other factors not captured in the study model. This suggests that apart from average collection period, leverage and firm size there are other factors that mitigate profit after tax of listed oil and gas firms in Nigeria. The results in table 6 illustrates that the ACP, LEV and FSZ have a positive and significant relationship with PAT measured with a beta coefficient (β_1=0.262047; β_2=0.006571; β_3=0.023257); and t- value of 2.332918; 4.290629 and 4.965253 with p-values of 0.0204; 0.0000 and 0.0000 respectively which is statistically significant at 5%. This beta coefficient revealed that if the degree of ACP, LEV and FSZ increases, then the sampled firms' profitability would equally increase by 26.208%, 0.657% and 2.32% in the form of profit after tax:

$$PAT_{it} = -0.170505 + 0.262047ACP_{it} + 0.006571LEV_{it} + 0.023257FSZ_{it} + \mu_{it}$$

In addition, Durbin-Watson test is implied to check the auto correlation among the study variables. The Durbin-Watson value is 1.515741 which is less than 2 provide an evidence of no auto-correlation among the variables.

Decision

Based on the empirical evidence that suggests that there is a significant and positive relationship between Average Collection Period and Profit After Tax of quoted manufacturing firms in Nigeria at 5% level of significance, hence, the alternative hypothesis of the study is accepted.

Table 7 Hausman Test between ACP and PAT

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	36.461572	3	0.0000

Source: E-Views 10 Regression Output, 2021

Interpretation of Post Regressed Result

The Hausman test in table 7 indicates that the Chi-Sq. Statistic value of 36.461572 with the p-value of 0.0000 is statistically significant at P-value of 0.05. Invariably, the fixed effect model (FEM) is preferable since the p-value of 0.0000 is less than 0.05. So, the null hypothesis is rejected and alternative hypothesis is accepted. Consequently, Average Collection Period has a significant and positive relationship with Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance.

Test of Hypothesis III

H_{O3}: There is no significant relationship between Average Payment Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

H_3: There is significant relationship between Average Payment Period and Profit after Tax of quoted Manufacturing Firms in Nigeria

Table 8: Panel Least Square Regression analysis testing the relationship between Average Payment Period and Profit after Tax

Dependent Variable: PAT
Method: Panel Least Squares
Date: 10/05/21 Time: 06:46
Sample: 2008 2020
Periods included: 13
Cross-sections included: 21
Total panel (balanced) observations: 273

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.140819	0.054211	-2.597604	0.0099
APP	0.900536	0.329350	2.734280	0.0067
LEV	0.005752	0.001660	3.465202	0.0006

FSZ	0.021215	0.004942	4.292966	0.0000

R-squared	0.374341	Mean dependent var	0.094249
Adjusted R-squared	0.345133	S.D. dependent var	0.099337
S.E. of regression	0.090766	Akaike info criterion	-1.946530
Sum squared resid	2.216127	Schwarz criterion	-1.893644
Log likelihood	269.7013	Hannan-Quinn criter.	-1.925300
F-statistic	18.93349	Durbin-Watson stat	1.515147
Prob(F-statistic)	0.000000		

Source: E-Views 10 Regression Output, 2021

Interpretation of Regression Results

From the analysed regression result in table 4.8; the regression equation signifies that:

PAT = -0.140819 + 0.900536APP + 0.005752LEV +0.021215FSZ

From the result presented in table 8, it could also be seen that APP, LEV and FSZ have a positive relationship with PAT. Using the coefficient of variation from the model presented in table 8, it is observed that PAT is positive at -0.140819 when all other variables are held constant. Consequently, a unit change in APP, LEV and FSZ will lead to a positive change of about 90%, 0.575% and 2.12% in PAT provided all other variables are held constant. From the adjusted R- squared of 0.345133, the regression co-efficient indicates that about 34.5 % of the changes in the dependent variable (PAT) is explained by the changes in the independent variables (APP, LEV and FSZ). The Durbin-Watson statistic of 1.515147 indicates the absence of auto – correlation since it is not more than the rule of Thumb of 2.The tool of F-statistic helps in determining the overall joint significant of the explanatory (independent) variables on the dependent or explained variable. At 5% level of significance, the probability of F-statistic = 0.000000 is less than the critical p-value at 0.05.

Decision

The null hypothesis is rejected since Prob(F-statistic) at 0.000000 is less than the critical value of 5% (0.05). This implies that there is a significant and positive relationship between Average Payment Period and Profit after Tax of quoted Manufacturing firms in Nigeria at 5% level of significance.

Table 9 Hausman Test between APP and PAT

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	29.381415	3	0.0000

Source: E-Views 10 Regression Output, 2021

From the Hausman test result in table 9, the p-value is 0.0000, this is statistically significant at the conventional level of 0.05. Thus, the Fixed Effect Model (FEM) is more appropriate than the Random Effect Model (REM) in analysing the relationship between APP, LEV, FSZ and PAT of quoted Manufacturing firms in Nigeria at 5% significant level.

Findings, Conclusion and Recommendations

Findings

In consonance with the analysis of this study, the following findings were deduced:

i. There is a significant and positive relationship between Inventory Turnover Period and Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance.
ii. There is a significant and positive relationship between Average Collection Period and Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance.
iii. There is a significant and positive relationship between Average Payment Period and Profit after Tax of quoted Manufacturing firms in Nigeria at 5% level of significance.

Conclusion

The thrust of this study was to ascertain the relationship between Cash Conversion Cycle and Profitability of quoted Manufacturing Firms in Nigeria for a period of thirteen (13) years spanning from 2008 - 2020. Cash Conversion Cycle which is the independent variable was proxied with Inventory Turnover Period, Average Collection Period and Average Payment Period while Profitability which served as the dependent variable was measured with Profit after Tax. Panel data were obtained from annual reports and accounts of the sampled manufacturing firms for the study period, using twenty one (21) manufacturing companies in Nigeria. Regression analysis was employed via E-Views 10. The results of the tested hypotheses revealed that there is a significant and positive relationship between Inventory Turnover Period, Average Collection Period, Average Payment Period and Profit after Tax of quoted Manufacturing Firms in Nigeria at 5% level of significance.

Recommendations

Based on the findings of this study, the following recommendations were made:

i. Firms should continue paying attention to proper inventory management by continuous standard setting that will help to maintain inventory at optimal level.
ii. Managers can improve their firm's profitability by shortening the accounts receivable period, in order to sustain the positive relationship between accounts receivable period and profitability.
iii. **For firms to remain** profitable, firms should wait longer to pay their bills taking advantage of credit period granted by their suppliers.

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Appendix I

Nigerian Exchange Group (NGX)
Listed manufacturing firms

A. Population of the Study

1. Consumer Goods

i. DN Tyre & Rubber Plc
ii. Champion Breweries Plc
iii. Golden Guinea Breweries Plc
iv. Nigerian Breweries Plc
v. Guinness Nigeria Plc
vi. International Breweries Plc
vii. Jos International Breweries Plc
viii. Premier Breweries Plc
ix. 7-Up Bottling Company Plc
x. Tiger Branded Consumer Goods Plc

xi. Dangote Sugar Refinery Plc
xii. Flour Mills of Nigeria Plc
xiii. Honeywell Flour Mills Plc
xiv. P.S Mandrides Plc
xv. Multi-Trex Integrated Foods Plc
xvi. Nascon Allied Industries Plc
xvii. Northern Nigeria Flour Mills Plc
xviii. Union Dicon Salt Plc
xix. UTC Nigeria Plc
xx. Cadbury Nigeria Plc
xxi. Nestle Nigeria Plc
xxii. Nigerian Enamelware Plc
xxiii. Vitafoam Nigeria Plc
xxiv. Vono products Plc
xxv. PZ Cussons Nigeria Plc
xxvi. Unilever Nigeria Plc

2. HealthCare

i. Ekocorp Plc
ii. Union Diagnostic and Clinical Services Plc
iii. Morison Industries Plc
iv. Evans Medical Plc
v. Fidson Healthcare Plc
vi. GlaxoSmithKline Consumer Nigeria Plc
vii. May & Baker Nigeria plc
viii. Neimeth International Pharmaceuticals Plc
ix. Nigerian German Chemicals
x. Pharma-Deko Plc

3. Industrial Goods

i. African Paints (Nigeria) Plc
ii. Austin Laz & Company plc
iii. Berger Paints Nigeria Plc
iv. Chemical and Allied Products Plc
v. Cement Company of Northern Nigeria
vi. DN Meyer Plc
vii. IPWA Plc
viii. Paints and Coatings Manufacturers Nigeria Plc
ix. Portland Paints and Products Nigeria Plc
x. Premier Paints Plc
xi. Lafarge Africa Plc
xii. Cutix plc
xiii. Beta Glass plc
xiv. Avon Crowncaps and Containers (Nig) Plc
xv. Grief Nigeria Plc
xvi. West African Glass Industry Plc
xvii. Nigerian Ropes Plc

4. AGRICULTURE

i FTN Cocoa Processors Plc
ii. Okomo Oil Farm Plc
i. Presco Plc
ii. Ellahlakes Plc

iii. Livestock Feeds Plc
iv. Smart Products Plc

APPENDIX II

Sample Size

i. Nigerian Breweries Plc
ii. Guinness Nigeria Plc
iii. Flour Mills of Nigeria Plc
iv. UTC Nigeria Plc
v. Nestle Nigeria Plc
vi. PZ Cussons Nigeria Plc
vii. Unilever Nigeria Plc
viii. Morison Industries Plc
ix. Evans Medical Plc
x. GlaxoSmithKline Consumer Nigeria Plc
xi. May & Baker Nigeria plc
xii. Neimeth International Pharmaceuticals Plc
xiii. Berger Paints Nigeria Plc
xiv. DN Meyer Plc
xv. Lafarge Africa Plc
xvi. IPWA Plc
xvii. Cutix plc
xviii. Grief Nigeria Plc
xix. FTN Cocoa Processors Plc
xx. Presco Plc
xxi. Livestock Feeds Plc