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MODERATING EFFECT OF FIRM SIZE ON THE RELATIONSHIP BETWEEN WORKING CAPITAL MANAGEMENT AND THE PROFITABILITY OF LISTED INDUSTRIAL GOODS COMPANIES IN NIGERIA

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Abstract

This study investigates the moderating effect of firm size on the relationship between the working capital management and profitability of listed industrial goods firms in Nigeria over the period from 2016 to 2023. The study adopts an ex-post facto research design, utilizing secondary data from financial statements of selected industrial firms to assess how working capital components account receivable days, inventory turnover days, account payable days, and cash conversion cycle along with firm size, influence profitability, measured by return on assets. The study used panel multiple regression for the analysis. The results show that account receivable days have a negative but insignificant effect on profitability, while inventory turnover days have a negative and significant effect. An account payable day also shows a negative but insignificant effect, and cash conversion cycle demonstrates a positive but insignificant effect on profitability. Firm size exhibits a negative and significant impact on profitability, indicating that larger firms may experience lower profitability. Furthermore, moderated account receivable days have a positive but insignificant effect, moderated inventory turnover days show a positive and significant effect, and both moderated account payable days and moderated cash conversion cycle have positive but insignificant and negative but insignificant effects, respectively. Based on these findings, it is recommended that industrial goods firms focus on optimizing inventory management practices to enhance profitability, as inventory turnover days significantly affect financial performance. Moreover, although firm size may not always enhance profitability, managers should be mindful of the potential negative effects of rapid expansion on profitability and work toward balancing growth with operational efficiency.

Keywords: *Firm Size, Working Capital Management, Profitability*

Introduction

The working capital management impact on profitability is considered more important now when global competition erodes prices, margins are low; companies need cash to expand both overseas and internally, to invest in new products and technology and pay down debt, turning to working capital as a source of cash represents a managerial tool. Undoubtedly, a sizeable number of companies have recognized working capital management as a true competitive advantage in ensuring profitability (Ching, *et al*., 2021).

Working capital management is an integral component of financial decision-making for businesses. It represents the ability of a firm to maintain a balance between liquidity and profitability (Uremadu et al., 2022). Liquidity, in this context, refers to the availability of funds to meet short-term financial obligations. Inadequate liquidity can lead to financial distress, while excessive liquidity can result in suboptimal profitability (Maaka, 2023). Therefore, striking the right balance is essential for the continuity of a company's operations. The balance between maintaining an adequate level of current assets, such as accounts receivable, inventory, and accounts payable, and current liabilities influences the company's ability to generate profits (Amanda, 2019). When a company maintains excessive current assets, it may incur unproductive costs that reduce profitability. Conversely, a lack of liquidity due to insufficient current

assets can lead to operational difficulties, reduced capacity to meet short-term financial obligations, and an increased exposure to liquidity risk.

Working Capital management of a firm, which deals with the management of current assets and current liabilities, has been recognized as an important area in financial management. Working Capital (WC) refers to the firm's investment in short-term assets. Both profitability and working capital are important for any firm survival. An asset is said to be liquid if it can be easily converted into cash without any loss of value. Low liquidity leads to the inability of a company to pay its debts as at when due. This could result to losses on account of non-availability of supplies and lead to possible insolvency. If loss of such incentives occurs, it may result in higher cost of goods which can affect the profitability of the business. The interests of the stakeholders are more in - r the liquidity position of a company before goods are sold on credit. An employee should be concerned about the liquidity of the company to know whether the company can meet their employee's obligations (Yeboah & Kjærland, 2024).

Working Capital Management is important as it has direct impact on the profitability of firms (Ray, 2022). To maintain liquidity and profitability of an organization, its working capital should be managed efficiently (Nazir & Afza, 2019). This entails planning and controlling current assets and current liabilities of firms with the view to reduce the risk of inadequate and non-availability of cash (Adeniji, 2018).

Okphiabhele, et al. (2022) posited that working capital management directly affects the liquidity and profitability of firms, the study argues that firms in a given large sample must vary in terms of size, age and Technology among others; that liquidity settings will also vary greatly depending on the risk appetite of the firm. Also, that firms will have different credit ratings that determines the way in which these firms make their purchases. According to Raheman and Nasr (2017) "Excessive level of current assets account can easily result in a firm realizing a substandard return on investment", hence the need to manage working capital. The working capital management variables considered by this study are; account receivables, inventories turnover, account payable and cash conversion cycle (Lukkaris&Eero, 2021).

Working capital management involves planning and controlling current assets and current liabilities in a manner that eliminates the risk of inability to meet short term obligations when due and to avoid excessive investment on current assets which leads to idle cash (Pharm et al., 2020)and looking at the nature of working capital and its components which are short lived, there is the need to manage working capital in order to attain profitability. "Current assets are short-lived investments that are continually being converted into other asset types" (Rao, 1989). When a firm maintain excessive current asset, it ends up tying down firm resources and that can affect profitability (Rahem& Nasir, 2021). Also, large inventory and a generous trade credit policy may lead to high sales, but that does not translate in to profitability (Rahem& Nasir, 2021). Efficient working capital management is necessary for achieving both liquidity and profitability of a company (Nazir&Afza, 2019). A poor and inefficient working capital management leads to tying up funds in idle assets and reduces the liquidity and profitability of a company (Reddy &Kameswari, 2014). Working capital management became important and necessary during the financial crisis up to 2008 because the cost of long-term debt increases and the new cost levels become difficult to attain, hence the need to manage working capital, especially when it can influence firm profitability and risk (Smith, 2018).

Keeping larger inventory by a firm reduces the likely risk of a stock-out (Rahem& Nasr, 2017), even at that, inventories are not to be kept at an arbitrary level, there is the need for deliberate planning and continuous check on the inventory. Given that Inventories can save the firm from the risk of losing an important customer by meeting up with their unexpected demand; however, keeping too much idle stock may create unnecessary liquidity shock to a firm thereby affecting firm profitability, hence the need for tradeoff between liquidity and profitability which is ultimately working capital management (Shin &Soenen, 2018).

Firms sometimes bought goods on credit from its suppliers meant to be payable in the near future, delaying payment to suppliers allows a firm to assess the quality of products bought, and can be an inexpensive and flexible source of working capital for the firm (Perri, 2018). This in essence allows firms to utilize the available cash that ought to be used for paying for supplies to another profitable investment opportunity. However, late payment of invoices can be very costly if the firm is offered a discount for early payment (Rahem& Nasr, 2017). This decision process need to be taken by top management and is considered as payables management and as a component of working capital, it can be seen as working capital management (Cannon, 2018).

Cash conversion circle is a fundamental tool applied in the assessment of the efficiency of working capital management (Richard & Laughlin, 1980). The common measure of working capital management (WCM) is the cash conversion cycle (CCC), this is the time between making payment for the raw materials purchased and the receipts of proceeds of sales of finished goods (Okphiabhele, et al., 2022). The more days a company's money is tied up in inventory, the longer the cash conversion cycle and the longer the number of days creditors must wait for their money (Jason &Kasozi, 2017). It is usually recommended that firms should have shorter cash conversion cycle for them to be profitable and remain credit worthy (Bibi&Ajmad, 2017).

A longer CCC may translate into poor profit as inventories are either not converted into goods on time or they are converted, sold and yet the debtors have delayed payment or we have delayed paying our creditors (Yusoff et al., 2018). Hence, when CCC is shortened, it is expected to improve firm's profitability. Longer CCC results to a greater need for expensive external financing as cash are tied down on inventories or because we have lost our credit worthiness as such we have to look elsewhere to finance that which ordinarily would have been made available to us by our creditors (Nordmeyer, 2015). Longer CCC ultimately suggest that the firm is less likely to obtain credit when needed and less likely to continue in business as it is cash trapped (Jason &Kasozi, 2017). When there is a reduction in the time cash are tied up in working capital, it tends to improve on the efficient operations of the firm.

It has been found that there are a lot of research work on working capital management and profitability but there is little that dwell on the Industrial Goods Firms in Nigeria. This has created a gab in the body of knowledge in the Industrial Goods Firms in Nigeria. Furthermore, most of the literature failed to recognize the moderating effect of firm size. This also necessitated this study.

Literature Review

Working Capital Management

Working Capital refers to the current assets and current liabilities of a company that can easily be converted to cash. They can also be referred to as circulating assets. They consist of stocks, accounts payables and receivable, cash and short-term securities. Stocks of raw materials acquired through purchases. The raw materials are converted into finished goods. The finished goods are then converted into cash, which is used to settle creditors from whom raw materials were purchased (Meginson, et al., 2018). Working capital is the excess of current assets over current liabilities. Current asset are the circulating assets of the company and are usually inform of cash in hand, cash at bank, account receivable (Debtors), inventories (Stock) and short-term or temporary investment while current liabilities on the other hand represent the indebtedness of the business to its supplier and other third parties (creditors) that fall due for the payment within the accounting period and are in these form: trade payable (creditors). Tax payable and other accrued expenses such as electricity bills, telephone bill and salaries.

Account Receivables

Provision of trade credit is normally used by businesses as a marketing strategy to expand or maintain sales (Pandey, 2014). Efficient receivables management augmented by a shortened debtors" collection period, low levels of bad debts and a sound credit policy often improves the businesses" ability to attract

new customers (Lazaridis & Dimitrios, 2015). Costs of cash discounts and costs of managing credit and credit collections constitute the carrying costs associated with granting a credit which increases when the amount of receivables granted are increased (Hansen & Mowen, 2015). Lost sales resulting from lack of granting credit constitute the opportunity cost which decrease when the amounts of receivables are increased (Lazaridis & Dimitrios, 2015). Michalski (2017) provides that an increase in the level of accounts receivables in a firm increases both the net working capital and the costs of managing accounts receivables, this also can lead to a decrease in the value of the firm. Lazaridis and Dimitrios (2015), argued that firms that pursue increase in their accounts receivables to an optimal level increase their profitability. Juan and Martinez (2022), emphasized that firms can create value by reducing their number of days of accounts receivable. Sushma and Bhupesh (2017) also affirmed that, putting in place a sound credit policy ensures proper debt collection procedures and is pivotal in improving efficiency in receivables management hence the performance of firms.

Accounts Receivable (AR) management is a crucial aspect of working capital management that significantly impacts a company's liquidity and profitability (Akomeah & Frimpong, 2019. However, it is equally essential for companies to establish an effective system to monitor and control adherence to these credit policies. This control system enables companies to take corrective actions when necessary, ensuring that AR is managed efficiently (Ehrhardt&Brigham, 2021).

Inventory Turnover Days

Inventories are raw materials, work-in-progress and finished goods (Serhii, 2015). Managers act rationally in managing their inventory efficiently if they are convinced that the practice enhances firm performance. Traditionally, inventories of raw materials, work-inprogress components, and finished goods were kept as a buffer against the possibility of running out of needed items (Serhii, 2015). Inventory management leading to inventory reduction has become the primary target, as is often the case in just-in-time (JIT) systems, where raw materials and parts are purchased or produced just in time to be used at each stage of the production process. This approach to inventory management brings considerable cost savings from reduced inventory levels. As a result, inventories have been decreasing in many firms (Chen, et al., 2015). According to Chen, et al. (2015), firms with high inventories usually have poor stock returns. On the other hand, firms with abnormally low inventories have ordinary stock returns. Inventory management leads to inventory reduction, as is often the case in JIT. He further gave support that firms that implement higher degrees of JIT manufacturing practices should outperform competitors who do not. Eroglu and Hofer (2021) argue that inventory leanness is the best inventory management tool. Lean production itself considers inventory as a form of waste that should be minimized and it has become synonymous with good inventory management (Eroglu& Hofer, 2021).

Accounts Payable

Accounts payable is said to be the aggregate amount of an entity'sshort-term obligation to pay suppliers for products or services when the entity purchase on credit (Moodley, et al, 2015). Accounts payable arise from trade credit, which is an important portion of working capital, if managed well, it will work in favour of both the buyer and the supplier. Here, the buyer is able to get short term financing from the seller, while the seller, by offering credit is able to push his products and built a relationship with the buyer. Sellers usually provide discount to encourage early payment from buyers. For example, the term "2/10 Net 30" indicate that the buyer will get a 2% discount if he pay within 10 days of purchase. If the buyer doesn't want to make use of the discount period, then payment should be made within 30 days of purchase.

Cash Conversion Cycle

The cash conversion cycle, which represents the interaction between the components of working capital and the flow of cash within a company, can be used to determine the amount of cash needed for any sales level (Hutchinson, 2017). Gitman (1974) developed a cash conversion cycle equation which is calculated

by adding inventory holding days to accounts receivables days and then subtracting accounts payable days from it and expressed it as follows: (CCC=ARD+ITO-APD). Its focus is on the length of time between the acquisition of raw materials and other inputs and the inflows of cash from the sale of finished goods, this represents the number of days of operation for which financing is needed (Botoc& Anton, 2017).

The CCC is a dynamic measure of ongoing liquidity management, since it combines both balance sheet and income statement data to create a measure with a time dimension (Jose & Lancaster, 2016). While the analysis of an individual firm's CCC is helpful, industry benchmarks are crucial for a company to evaluate its CCC performance and assess opportunities for improvement because the length of CCC may differ from industry to industry, the best check for CCC is to compare with Industry bench mark (Hutchinson, 2017). The cash conversion cycle is used as a comprehensive measure of working capital as it shows the time lag between expenditure for the purchase of raw materials and the collection for sales of finished goods (Padachi, 2016). Day-to-day management of a firm's short term assets and liabilities plays an important role in the success of the firm. Good liquidity management is the pointer to healthy bottom lines of Firms (Jose & Lancaster, 2016). According to Arnold (2018), the longer the CCC, the higher is the requirement for investment in working capital, however, a longer cycle could increase sales, which could lead to higher profitability. Authors like Shin and Soenen (1993) have argued that it is important for firms to shorten the CCC. A higher CCC can actually hurt a company's profitability by increasing the time that cash is tied to non-interest-bearing accounts such as accounts receivables. By shortening the CCC the company's cash flows will have a higher net present value because cash is received quickly (Sharma & Kumar, 2021).

Profitability

There has been various measures of Profitability, for example return on sales reveals how much a company earns in relation to its sales, Profitability's determines an organization's ability to make use of its assets and return on equity reveals what return investors take for their investments (Ebaid, 2019 and Abor, 2015) as reported by Lucy Wamugoet al. (2014). Traditionally, the success of a manufacturing system or company can be evaluated by the use of financial measures (Tangen, 2013).

According to Walt (2019), profitability is the form of measuring the economic success of a firm in terms ofthe capital invested in the business Liquidity and profitability have been disclosed and analyzed extensively. For the survival of any business, it must be anchored on its liquidity while its long-term survival/growth and expansion depends on profitability. It entails that working capital ensures short term survival and profitability ensures long term survival.

Sharaf and Haddad (2015) defined profitability as the position of providing monetary gain which is the main goal of any firm. Thus without it, businesses will be discontinued thereby regarding increase of profitability as an important task. Therefore, the measurement of previous year's profits and foretelling profits are important. There are varieties of profitability ratios used in monitoring the financial health of a business (Muhammad & Imran, 2015). Sharaf and Haddad (2015) defined profitability as the position of providing monetary gain which is the main goal of any firm. Thus without it, businesses will be discontinued thereby regarding increase of profitability as an important task. Therefore, the measurement of previous year's profits and foretelling profits are important. There are varieties of profitability ratios used in monitoring the financial health of a business (Muhammad & Imran, 2015).

Pecking order theory

Myers and Majluf (1984) introduced very influential pecking order theory saying that managers prefer to finance deficit of capital by issuing safe security. The theory states that in the event where retained earnings and other internal source of financing will be low to invest, and then the manager(s) will issue debt and only issue new equity with possibility of issue junk debt. A determinant of cash holding from the perspective of pecking order theory has been supported by other researchers more than trade off theory.

Sebastian (2010) examined how Dutch firm's liquidity and solvency interacts through the information and leverage channels. Frank and Goyel (2002) came up with evidence that bigger firms are more organized to take decision. Soku (2008) observed that larger firms perform using internal funds and safe debt in order to maintain financial flexibility rather than issuing equity.

Empirical

Hailu and Venkateswarlu (2015) examined the effect of working capital management on firm's profitability evidence from manufacturing companies in Eastern Ethiopia spanning over the year 2010 to 2014, using a sample of 30 companies with total observations of 150. The results of their study indicates that a longer accounts receivable and inventory holding periods are associated with lower profitability. Laura and Marius (2014) examined the management of working capital and firm performance in the Romanian pharmaceutical sector, for year 2002-2012, the result of their study shows a significant negative, but weak relationship between working capital and firm profitability. This indicates that, the shorter the period between production and sale of products, the larger the firm's profitability.

Waler et al. (2014) examine the effect of working capital management on firm performance using a firm listed on the Zambawestaock exchange for the period 2009-2013, using a sample of 39 firms from the eighteen sectors of the manufacturing companies. The findings of he study indicaes that account receivable have negative effect on profitability of the firm. Thus, the negative effect can be attributed to the capital market crises witness all over the world. In a similar study conducted in Nigeria Ademola (2014) carried out a study on the impact of working capital management on profitability of he listed manufacturing companies in Nigeria over the period 2002 to 2011 using 120 firm-year observation. The result of the study indicates that net operating profit has significant positive relationship with profitability of the firm, while account collection period have significant negative relationship with profitability of the firm. Thus, this findings could be attributable to lack of conducing a normality test as none of the normality test was carried out.

Taani (2022) conducted a study in Amman by running multiple regression analysis for the working capital management and the firm performance. Working capital was measured by the financial leverage and debt ratio PROF and return in equity (ROE) were used to measure firm performance. Their result suggests that working capital management policy did not have a significant relationship with ROE and PROF.

A study of profitability and working capital management of Brazilian listed companies has been conducted by Ching, et al. (2021). They conducted a study for companies that use working capital intensive and fixed capital intensive. The authors concluded that managing working capital properly is equally important regardless of the type of the company. Profitability (PROF) and return on sales (ROS) are used to measure firm profitability. Both of the measurement have different factors that could affect their value. In PROF, days' inventory held plays the biggest role while in ROS, CCC efficiency and length of inventories held are important to ensure greater return. Fixed capital intensive, number of days in working capital and debt ratio are the variables that affect ROS and PROF respectively.

Nazir and Afza (2019) conducted a study on working capital requirements and the determining factors in Pakistan. They used samples of 132 manufacturing firms from 14 industry groups that were listed on Karachi Stock Exchange (KSE). The period of observations ranging from year 2004 until 2007. Working capital requirement acts as dependent variable while independent variables used are operating cycle (OC), operating cash flows (OCF_TA), level of economic activity in the country (EA), growth, Profitability, Tobin's q (Q), leverage (Lev), size and industry dummy (IndDum). The study found out that operating cycle, leverage, PROF and Tobin's q; which are the internal factors, are influencing the working capital requirements significantly.

Methodology

The study adopt ex-post facto (after — the — fact) research design. Ex-post-factor research design is defined as that research in which the independent variable or variables have already occurred and which the researcher start with the observation of a dependent variable or variables.

The population of the study consist of the twenty-one industrial goods firms quoted on the Nigeria Exchange group (NEG) for a period of Eight (8) years from 2016 to 2023.

However, five companies were substituted, remaining Sixteen (16) as the sample size. Another one was also eliminated because it did not make available its financial statement to the Nigerian exchange group within the period of the study, hence, one (1) firm was eliminated leaving Fifteen (15). However, the remaining Fifteen (15) were used as our adjusted sample for the study.

For the purpose of this study multiple regressions was employed as a technique for data analysis. Multiple regression was used since the study aims at explaining the impact that exist between the dependent and two or more independent variables.

The model for the study is presented below

$PROFit = \beta 0 + \beta_1 ARDit + \beta 1_2 ITOit + \beta 3APDit + \beta_4 CCCit + \beta_5 FSit + \beta_6 ARDFSit + \beta_7 ITOxFSit + \beta_8 APD_X FSit + \beta 9CCCxFSit + \varepsilon it.$

Where:

PROF = Profitability
ITO = Inventories Turnover Days
ARD =Account Receivable Days
APD = Account Payable Days
CCC = Cash Conversion Cycle
Fsize =Firm size
i = i term denoting the number of firms from 1-9
t=t term denoting the time period ranging from 2016-2023.
εit = error term of the model
β0=intercept of the regression equation
β1 – β9 = are the coefficient of the parameter estimate.

Table 1: Variable Measurement

Variable	Variable Name	Variable Measurement	Sources
PROF	Profitability	Net income – Total asset	Woolf (2008)
ITO	Inventory Turnover Days	Cost of Goods sold/Average Inventory *365	Abdul, Talat, Abdul and Mahmood (2010) and Ahmed (2010)
ARD	Account Receivable Days	Account Receivable /sales*365	Gamze, Ahmet and Emin (2012) and Hailu and Venkateswarlu (2015)
APD	Account Payable Days	Account payable/ cost of Goods sold*365	Usama (2012) and Saswata (2010).
CCC	Cash conversion cycle	ARD+ITO-APD	Haq, Muhammad, Khalid &Zaheer (2011) and Ray (2012)
FSIZE	Firm Size	Ln(Total Assets)	Makori&Jagongo (2013)

Source: Compiled by the author, 2024

Result and Discussion

Table 2: Descriptive Statistics

Variable |	Obs	Mean	Std. dev.	Min	Max
prof |	120	1.556591	1.021065	.01	5.03
ard |	120	284.0909	167.6054	66	730
ito |	120	55.43182	38.85629	2	140
apd |	120	79.10227	34.93542	25	168
ccc |	120	260.4773	140.6753	60	619
fs |	120	7.648864	.5653957	6.29	8.56
ardts |	120	2130.318	1197.055	543.0105	5217.127
itots |	120	426.3497	308.1803	15.72	1198.4
apdts |	120	594.1594	242.5854	187.3365	1229.241
cccts |	120	1962.509	1008.068	464.142	4725.722

Source: Stata Output, 2024

The profitability of industrial goods firms in Nigeria exhibits a broad range, spanning from a minimum of **0.01** to a maximum of **5.03**, reflecting significant variations in financial performance across the sector. This range suggests that while some firms operate with very thin profit margins, others generate considerably higher returns, likely due to differences in operational efficiency, cost management, market positioning, and competitive advantages.The average profitability of **1.56** represents the mean level of earnings generated by industrial goods firms. This figure provides a useful benchmark for assessing overall sector performance. Firms with profitability above this average can be considered relatively high-performing, whereas those below it may face challenges such as high operational costs, low sales volume, or inefficient management practices.

The Accounts Receivable Days (ARD) indicate the average number of days it takes for a company to collect payments from its customers after a sale. For industrial goods firms in Nigeria, ARD ranges between 66 days and 730 days, reflecting a significant disparity in how quickly firms recover outstanding invoices. Firms with ARD on the lower end of this range, around 66 days, exhibit efficient credit policies and strong cash flow management, ensuring that payments are collected within a reasonable time frame. On the other hand, firms with ARD as high as 730 days equivalent to two years face extreme delays in recovering receivables, which could signal poor credit control, weak enforcement of payment terms, or financial distress among customers. This wide gap suggests a lack of uniformity in credit policies and collection efficiency across the sector.The average ARD of 284 days highlights a concerning trend, as it suggests that, on average, firms in this sector take almost ten months to collect their receivables. This extended collection period can create serious cash flow challenges, limiting a firm's ability to meet short-term financial obligations, pay suppliers on time, and reinvest in operations. High ARD values often indicate inefficient credit management, where firms extend excessive credit to customers without strict collection policies. Additionally, macroeconomic factors such as inflation, currency fluctuations, and

weak purchasing power in Nigeria may contribute to delayed payments, as customers struggle to settle their debts.

Inventory Turnover Days (ITO)measures the average number of days it takes for a company to sell its inventory and replenish stock. For industrial goods firms in Nigeria, ITO ranges between 2 days and 140 days, indicating significant variation in inventory management efficiency. Firms with ITO as low as 2 days have high inventory turnover, meaning they quickly sell products and replenish stock, likely due to strong demand, efficient supply chain management, or just-in-time inventory practices. Conversely, firms with ITO as high as 140 days experience slow inventory movement, which may be due to weak sales, overstocking, or supply chain inefficiencies. The wide disparity suggests that while some firms efficiently manage inventory levels, others struggle with excess stock, potentially leading to increased holding costs and product obsolescence.The average ITO of 55 days means that, on average, firms take nearly two months to sell and replace inventory. This is a moderate turnover rate, suggesting that while sales cycles are not excessively prolonged, there is room for improvement in stock management practices. A high ITO can indicate challenges such as declining demand, ineffective marketing strategies, or supply chain disruptions that slow down inventory movement. Conversely, firms with a lower ITO are more likely to generate consistent revenue, optimize warehouse space, and reduce the risk of outdated inventory.

Accounts Payable Days (APD) measure the average number of days a company takes to settle its outstanding payments to suppliers. For industrial goods firms in Nigeria, APD ranges between 25 days and 168 days, showing considerable variation in how firms manage their payment obligations. Firms with an APD as low as 25 days settle their debts relatively quickly, which may indicate strong liquidity, favorable supplier relationships, or strict credit policies that require prompt payments. On the other hand, firms with an APD as high as 168 days take over five months to pay their creditors, suggesting that they are either strategically using supplier credit to manage cash flow or facing financial difficulties that delay payments. The large disparity in APD values implies differences in financial strategies, supplier negotiations, and overall liquidity positions across firms.The average APD of 79 days indicates that, on average, firms take about two and a half months to pay their suppliers. This suggests that while some firms make prompt payments, others significantly extend their payables, potentially using supplier credit as a form of short-term financing. A moderate APD can be beneficial as it allows firms to retain cash for other operational needs; however, excessive delays in payment may strain supplier relationships, lead to penalties, or result in reduced credit terms in the future.

The **Cash Conversion Cycle (CCC)** measures the time it takes for a company to convert its investments in inventory and other resources into cash flow from sales. For industrial goods firms in Nigeria, the CCC ranges from **a minimum of 60 days to a maximum of 619 days**, highlighting a substantial difference in how efficiently firms manage their working capital. Firms with a **CCC of 60 days** operate with a short cycle, meaning they quickly convert inventory into sales and collect payments from customers, allowing them to reinvest cash into operations more frequently. On the other hand, firms with a **CCC as high as 619 days** take significantly longer over **20 months**to complete the cycle, which could indicate challenges such as slow-moving inventory, delayed receivables collection, or prolonged payment terms to suppliers. Such an extended cycle may create liquidity issues, limiting the firm's ability to fund operations and expansion.The **average CCC of 260 days** suggests that, on average, industrial goods firms take nearly **nine months** to convert cash invested in operations back into liquid funds. While this is a reasonable duration for capital-intensive industries, it also indicates potential inefficiencies in inventory turnover, accounts receivable collection, or supplier payment strategies. A long CCC can strain cash flow, forcing firms to rely on external financing to cover operational costs.

Firm size represents the scale of a company's resources, typically measured through total assets, revenue, or market capitalization. In the case of industrial goods firms in Nigeria, the firm size variable has a **mean**

of 7.648864, with a **minimum value of 6.29** and a **maximum value of 8.56**. The relatively narrow range suggests that most firms in the sector operate within a similar scale, though some are significantly larger or smaller than others. Firms with a size value of **6.29** represent the smallest players in the industry, possibly characterized by limited resources, lower production capacity, and reduced market share. On the other hand, firms with a **size value of 8.56** are the largest in the sector, possessing extensive resources, strong financial backing, and possibly greater competitive advantages in terms of economies of scale and market influence.The **mean firm size of 7.648864** suggests that, on average, industrial goods firms in Nigeria have substantial resources and operational capabilities. A larger firm size is generally associated with better access to financing, stronger bargaining power with suppliers, and increased resilience to economic fluctuations. However, larger firms may also face bureaucratic inefficiencies and higher operational costs, which can impact overall performance. Conversely, smaller firms may be more agile and adaptable but may struggle with financial constraints and limited market reach.

Moderated Accounts Receivable Days (ARD) represent the adjusted duration firms take to collect payments from customers after making sales. In the case of industrial goods firms in Nigeria, the **moderated ARD ranges between 543 days and 5,217 days**, highlighting a significant disparity in receivables collection efficiency. Firms on the lower end, with **543 days**, already experience extended collection periods, indicating possible delays in payment from customers. However, firms on the higher end, with **5,217 days**, take an extraordinarily long time over **14 years**to recover their receivables, which raises concerns about financial sustainability and liquidity management. Such prolonged collection periods may stem from weak credit policies, poor customer payment enforcement, or industry-wide challenges such as long-term contract agreements with deferred payment terms. Firms facing excessive ARD may encounter severe cash flow constraints, increasing their reliance on external financing to sustain operations.Similarly, **moderated Inventory Turnover Days (ITO)** range between **16 days and 1,198 days**, indicating variation in how quickly firms convert inventory into sales. Firms with **16 days** of inventory turnover operate efficiently, quickly selling and restocking goods, likely benefiting from strong demand, efficient supply chain management, or optimized production cycles. Conversely, firms with **1,198 days** of inventory turnover take over **three years** to clear their stock, suggesting slow-moving inventory, possible overstocking, or weak sales performance. A prolonged ITO can lead to increased holding costs, product obsolescence, and potential financial strain. To mitigate these issues, firms should focus on improving demand forecasting, optimizing inventory management systems, and adopting more aggressive sales strategies to enhance turnover rates. A balanced approach to receivables collection and inventory management is essential to maintaining operational efficiency and financial stability.

Moderated Accounts Payable Days (APD) represent the adjusted duration firms take to settle payments to suppliers. For industrial goods firms in Nigeria, the minimum APD is 187 days, while the maximum extends to 1,229 days. Firms at the lower bound, taking approximately six months to pay creditors, demonstrate a moderate approach to supplier credit management. This indicates a balance between maintaining liquidity and sustaining good relationships with suppliers. However, firms with 1,229 days over three years delay payments significantly, likely using supplier credit as a form of long-term financing. While delaying payments can provide short-term liquidity benefits, excessively long payment periods can strain supplier relationships, reduce trust, and lead to higher costs due to penalties or restricted access to future credit. Effective payables management requires firms to optimize payment cycles by negotiating favorable terms while ensuring that prolonged delays do not disrupt supply chains. Similarly, Moderated Cash Conversion Cycle (CCC), which measures the time taken to convert investments in working capital into cash, ranges between 464 days and 4,726 days. A 464-day CCC suggests firms take over 15 months to cycle cash through operations, which already indicates inefficiencies in working capital management. However, firms with 4,726 days CCC nearly 13 years face extreme delays in recovering cash, suggesting

challenges such as slow inventory turnover, excessive credit sales, or inefficient collection processes. Such prolonged cycles can lead to severe liquidity constraints, forcing firms to depend heavily on external financing for operations. To enhance financial stability, firms should implement strategies to speed up receivables collection, optimize inventory turnover, and streamline payables management, thereby reducing the CCC and improving cash flow efficiency.

Table 3: Correlation Results

	prof	ard	ito	apd	ccc	fs	ardts	itots	apdts	cccts
PROF	1.0000									
ARD	0.0893	1.0000								
ITO	0.1827	-0.0851	1.0000							
APD	0.0960	0.8799	-0.1375	1.0000						
CCC	0.1328	0.9495	0.2095	0.7623	1.0000					
FS	-0.2183	-0.4543	0.1086	-0.5455	-0.3758	1.0000				
ARDTS	0.0539	0.9915	-0.0795	0.8606	0.9457	-0.3515	1.0000			
ITOTS	0.1707	-0.1309	0.9928	-0.1924	0.1665	0.2114	-0.1165	1.0000		
APDTS	0.0480	0.8760	-0.1371	0.9821	0.7622	-0.3930	0.8803	-0.1784	1.0000	
CCCTS	0.1047	0.9265	0.2421	0.7267	0.9905	-0.2582	0.9400	0.2103	0.7501	1.0000

Source: Stata Output, 2024

Correlation analysis is used to measure the strength and direction of the relationship between two variables. In the context of this study, correlation results reveal the degree to which working capital management, firms' size relates with profitability. A positive correlation indicates that as one variable increases, the other variable tends to increase as well. If there is a positive correlation between governance report disclosure and market value. A negative correlation, on the other hand, means that as one variable increases, the other decreases. If the correlation coefficient is close to +1 or -1, it indicates a strong relationship between the variables. A correlation near 0 suggests little to no linear relationship.

Table 4 Multicollinearity Result

Variable	VIF	1/VIF
ccc	12.648	0.07906
ard	10.926	0.09153
ito	8.74	0.114401
apd	2.16	0.463458
fs	1.56	0.640108
Mean VIF	4.96	

Source: Stata Output, 2024

The result showing that the Mean Variance Inflation Factor (VIF) is 4.96, which is well below the threshold of 10, indicates that there is no multicollinearity problem among the variables of interest in the model. The VIF is used to assess how much the variance of an estimated regression coefficient is inflated due to collinearity with other variables in the model. A VIF value greater than 10 generally suggests a potential multicollinearity issue, meaning the independent variables are highly correlated with one another, which can lead to unreliable coefficient estimates. Since the Mean VIF in this case is 4.96, it suggests that the independent variables are not highly correlated with each other. This is a favorable outcome because it implies that each variable in the model is providing unique information and that the relationships between the independent variables are not distorting the regression analysis. In essence, the results can be trusted to reflect the true impact of the independent variables on the dependent variable without interference from multicollinearity. This enhances the reliability of the regression coefficients, making them more accurate and interpretable.

Table 5 Hausman Specification

Test of H0: Difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 6.07

Prob> chi2 = 0.5313

(V_b-V_B is not positive definite)

Source: Stata Output, 2024

A p-value of 53% in the Hausman specification test suggests that the null hypothesis cannot be rejected, meaning there is no significant difference between the fixed and random effects models. In this case, the p-value is well above the typical threshold of 0.05, which indicates that the random effects model is appropriate for the study. This implies that the unobserved individual-specific effects are not correlated with the explanatory variables, and the random effects model provides consistent and efficient estimates.

Table 6: Lagrange Multiplier (LM)

	Var	SD = sqrt(Var)
prof	1.042574	1.021065
e	.0863065	.2937796
u	0	0

Test: Var(u) = 0

chibar2(01) = 0.00

Prob> chibar2 = 0.0000

Source: Stata Output, 2024

The significant p-value of 0.0000 in the Lagrange Multiplier (LM) test confirms that the random effects model is preferred over the pooled OLS model. This result is consistent with the findings from the Hausman specification test, which also indicated that the random effects model is appropriate for the study.

Table 7: Regression

R-squared: 0.7177

Prob> chi2 = 0.0000

prof	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
ard	-.010309	.011459	-0.90	0.368	-.0327682	.0121503
ito	-.0314148	.0122621	-2.56	0.010	-.0554481	-.0073814
apd	-.0344834	.0251094	-1.37	0.170	-.0836969	.01473
ccc	.0159284	.0139601	1.14	0.254	-.011433	.0432897
fs	-.6500411	.2341288	-2.78	0.005	-1.108925	-.191157
ardts	.0028056	.0015586	1.80	0.072	-.0002492	.0058605
itots	.0059599	.0016958	3.51	0.000	.0026362	.0092837
apdts	.0028449	.0033175	0.86	0.391	-.0036572	.009347
cccts	-.0036391	.0019155	-1.90	0.057	-.0073934	.0001152

Source: Stata Output, 2024

Test of Hypotheses

The model shows good fit with a Chi-square value of 0.0000, which indicates that the model is statistically significant and explains the relationship between the variables well. A p-value of 0.0000 suggests that the overall model is highly significant, meaning that the likelihood of obtaining the observed results under the null hypothesis is virtually zero, thus confirming the model's validity. Furthermore, the R-squared value of 72% indicates that approximately 72% of the variation in the profitability of manufacturing firms is explained by the effect of the independent variables. This suggests a strong relationship between these factors and the Profitability. However, the remaining 28% of the variation is explained by other exogenous variables that are not included in the model, highlighting that while the model is robust, there are additional factors influencing profitability that need to be considered.

Accounts Receivable Days and Profitability

The finding that **accounts receivable days (ARD) have a negative but insignificant effect on profitability** of industrial companies in Nigeria suggests that while longer collection periods may slightly reduce profitability, the impact is not statistically significant. In other words, while firms that take longer to collect payments from customers may experience some reduction in profitability due to delayed cash inflows and higher working capital requirements, this effect is not strong enough to be considered a key determinant of profitability in the industrial sector. As a result, the study accepts the hypothesis that accounts receivable days do not have a significant effect on profitability.

Inventory Turnover Days (ITO) and Profitability

The result indicating that inventory turnover days (ITO) has a negative and significant effect on the profitability of industrial companies in Nigeria presents an intriguing insight into the relationship between inventory management and firm performance. Inventory turnover days measure the average time a company takes to sell its inventory, and a lower turnover indicates that inventory is held for a longer period. The negative effect on profitability suggests that when firms hold inventory for extended periods, they incur higher storage costs, reduced liquidity, and a greater risk of inventory obsolescence, all of which can erode profitability. In contrast, faster inventory turnover, which typically implies better inventory management and sales efficiency, could potentially improve cash flow and reduce operational costs. However, the finding that an increase in inventory turnover leads to a decrease in profitability may reflect a situation where firms are overly aggressive in their sales strategies or pricing, potentially leading to lower profit margins and, ultimately, reduced profitability.

Accounts Payable Days (APD) and Profitability

The result indicating that accounts payable days have a negative but insignificant effect on the profitability of industrial companies in Nigeria suggests that the timing of supplier payments does not substantially influence financial performance. This implies that while delaying payments to suppliers might temporarily improve cash flow, it does not translate into higher profitability. Firms often use trade credit as a short-term financing strategy, allowing them to allocate available funds to operational activities or investments. However, the insignificance of the effect suggests that industrial companies may not be effectively

utilizing extended payment periods to enhance their financial outcomes. Additionally, suppliers may impose stricter credit terms or higher costs on firms that delay payments, neutralizing any potential financial benefit. This highlights the need for companies to adopt a more strategic approach to managing accounts payable, ensuring that they maintain a balance between liquidity and supplier relationships.

Cash Conversion Cycle (CCC) and Profitability

The result indicating that the **cash conversion cycle (CCC) has a positive but insignificant effect on profitability** of industrial companies in Nigeria suggests that the time taken to convert investments in working capital into cash does not play a critical role in determining firm profitability. The CCC measures how long a company takes to sell inventory, collect receivables, and pay its obligations. A longer CCC typically indicates that a firm has extended credit to customers or is holding inventory for extended periods, while a shorter CCC suggests quicker cash recovery and improved liquidity. However, the fact that this study finds no significant effect implies that merely managing the duration of the CCC does not necessarily drive profitability in industrial firms.

Firm Size and Profitability

The result finds that firm size has a negative significant effect on the profitability of industrial firms in Nigeria suggests that as firms grow in size, their profitability tends to decline. This may be due to increased operational costs, inefficiencies, or difficulties in managing large-scale operations. Larger firms often face bureaucratic inefficiencies, high administrative expenses, and challenges in maintaining flexibility, which can hinder their ability to sustain high profitability levels. Additionally, the diminishing marginal returns theory suggests that after a certain threshold, expanding firm size does not necessarily translate into increased profitability, as additional resources may be allocated inefficiently.

Moderated Account Received and Profitability

The finding that moderated accounts receivable days have a positive but insignificant effect on the profitability of industrial companies in Nigeria suggests that while an increase in moderated accounts receivable days may lead to slight improvements in profitability, the relationship is not strong enough to be statistically significant. This implies that extending credit terms or adjusting receivables management strategies does not have a substantial impact on firm profitability when considering the moderating factor. The acceptance of the hypothesis indicates that variations in accounts receivable days, even when influenced by external conditions or firm-specific attributes, do not meaningfully alter financial performance.

Turnover Days and Profitability

The result indicating that moderated inventory turnover days have a positive significant effect on the profitability of industrial companies in Nigeria suggests that a more efficient management of inventory directly influences profitability. An increase in inventory turnover, which implies that firms are able to sell their inventory and replenish it more quickly, can reduce holding costs such as storage, insurance, and obsolescence. Additionally, faster inventory turnover helps improve liquidity, as capital is tied up in inventory for a shorter duration, making it available for other profitable investments. This finding supports

the importance of operational efficiency in ensuring that inventory is optimized to meet customer demand while minimizing excess stock, which can lead to improved financial performance.

Payable Days and Profitability

The result indicating that moderated account payable days have a positive but insignificant effect on the profitability of industrial companies in Nigeria suggests that extending payment periods to suppliers does not substantially influence the financial performance of these firms. While delaying payments may improve short-term cash flow, it does not necessarily translate into higher profitability. This could be due to firms already optimizing their payment cycles within reasonable limits, ensuring that delayed payments do not disrupt supply chain relationships or operational efficiency. Additionally, suppliers may impose stricter credit terms or higher costs on firms with prolonged payment cycles, negating any potential benefits of extended payables.

Conversion Cycle and Profitability

The result indicates that the moderated cash conversion cycle (CCC) has a negative but insignificant effect on the profitability of industrial companies in Nigeria. This suggests that although shortening or lengthening the CCC may have some influence on profitability, its overall effect is not strong enough to be considered statistically significant. A negative effect implies that a longer CCC may lead to a reduction in profitability due to inefficiencies in managing working capital, such as excessive inventory holding costs or delayed cash inflows from receivables. However, the insignificance of the relationship suggests that other factors, such as firm size, market dynamics, and industry-specific conditions, may play a more critical role in determining profitability. The result shows that moderated cash conversion cycle has a negative but insignificant effect on profitability of Industrial companies in Nigeria leads to the acceptance of hypothesis that moderated cash conversion cycle has no significant effect on profitability of Industrial companies in Nigeria.

Conclusion and Recommendations

The study concludes that accounts receivable days (ARD) have a negative but statistically insignificant effect on the profitability of industrial companies in Nigeria. This suggests that while shorter ARD may contribute to better liquidity and operational efficiency, its direct impact on profitability is minimal. The finding implies that industrial firms in Nigeria might not rely solely on reducing ARD to enhance profitability, as other financial and operational factors play a more significant role in driving firm performance.

The study concludes that while higher inventory turnover may lead to operational efficiency, it can simultaneously exert downward pressure on profitability, especially when companies engage in discounting or reducing prices to increase turnover. This negative relationship, as indicated by the significant effect of inventory turnover days on profitability, suggests that firms must carefully balance their inventory management strategies to avoid detrimental effects on profit margins.

The study recommends the following:

Industrial firms in Nigeria should maintain an optimal credit policy that balances cash flow efficiency with customer retention. While reducing ARD may not significantly enhance profitability, firms should still implement strategies to avoid excessive delays in receivables collection, such as setting clear credit terms, using automated invoicing, and offering early payment incentives. Additionally, firms should focus on other critical factors influencing profitability, such as cost management, operational efficiency, and investment in revenue-generating activities. A comprehensive working capital management approach will ensure financial stability while maintaining a competitive edge in the market.

Based on the findings, industrial companies in Nigeria should adopt a strategic approach to inventory management that goes beyond merely increasing turnover. Firms are advised to focus on improving inventory turnover by enhancing operational efficiency but also to implement robust pricing strategies to mitigate the potential negative impact on profitability. Companies should invest in advanced inventory management systems that optimize stock levels and reduce storage costs without having to resort to significant discounts. Additionally, conducting a thorough analysis of market demand, customer behavior, and industry trends will help in adjusting inventory policies appropriately. Managers should also consider periodically reviewing the effectiveness of their inventory management practices to ensure they align with profitability goals and market conditions.

Industrial firms should focus on optimizing their accounts payable management rather than merely extending payment durations. Firms should negotiate favorable credit terms with suppliers to balance liquidity needs and supplier relationships. Additionally, firms should explore alternative working capital management strategies, such as improving inventory turnover and accelerating accounts receivable collection, to enhance profitability. Since accounts payable alone does not significantly impact profitability, companies should integrate it within a broader financial strategy that considers operational efficiency, cost management, and investment in productive assets.

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