Effect of Inventory Management and Financial Performance of Manufacturing Firms in Nigeria

Abstract

The study seeks to access the impact of inventory management and organizational performance of selected manufacturing firms in Nigeria. The ex-post facto designs was adopted in this study. The study population consist of 56 listed manufacturing companies on the Nigerian Stock Market. Using a purposive sampling method, the 11 companies were selected. The study used the multiple ordinary least square regression technique, specifically the panel regression model for testing the hypotheses stated. The first findings revealed that, cash conversion cycle has a negative significant effect on return on assets of listed manufacturing firms in Nigeria. While, the second hypotheses tested revealed that, account receivable turnover has a positive significant effect on return on assets of listed manufacturing firms in Nigeria. The last hypothesis tested revealed that, account payable turnover has a positive significant effect on return on assets of listed manufacturing firms in Nigeria. As a result, it is recommended that, manufacturing firms in Nigeria should speed up conversion of finished goods into sales. This can be done through putting in place good marketing strategies that ensure quick sales of products to attract more revenue and profit. Also, the firms should ensure that only credit worthy customers are given goods on credit to ensure prompt account receivables. This will boast quick returns and increase the profit of the firms. Lastly, the manufacturing firms should improve on timely payment of credit purchases. This will enable suppliers have more confidence in entrusting more raw material to the firms on credit which will boast their inventories as well increase sales and profit.

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1.1 Introduction

Inventory did not previously have access to the required control measures. In fact, having too much inventory was seen as a sign of affluence. At that time, management saw overstocking as important to and beneficial to businesses. Today, however, businesses are beginning to adopt efficient inventory control. (Michael and Susan, 2000). In many industries, inventory is increasingly seen as a tool for making the best use of resources and improving overall organizational efficiency. Inventory management systems assist organizations to detect special requests, sell on occasion and available product in a limited amount to keep inventory costs down and to build a positive reputation for promptly filling orders, according to (Akindipe, 2014) and (Ali et al., 2012).Globally, inventory management is still a crucial component of every business because inefficient inventory systems can result in lost clients and revenues, while efficient inventory management can increase sales for the business, directly impacting its success. (2016) Mohammed, Suraidi, Abd-Raham, and Suhami Inventory can include either things that will be consumed or utilized in the creation of goods that will be sold, as well as assets and items retained in the normal course of business.Because inventory control is directly related to production in any organization, it implies that the operation of the inventory management system will have an impact on an organization's profitability either directly or indirectly. Inventory control is the management of activities with the goal of getting the right materials in the right quality and quantity, in the right place at the right time (Ahn, 2020). Even though inventory is expensive and challenging to manage, it is necessary to deliver excellent customer service.Inventory management entails the processing and application of controls within the economic framework to ensure high

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standards of customer service, while avoiding the accumulation of large inventories that can drain funds and result in losses.

A company's inventory of raw materials needed to make items is considered a current asset because it is often consumed or sold within a year.

Before inventory can be included in the statement of financial activities, it must first be physically counted or measured. Production and sales of a product are connected by inventory. A manufacturing business is required to have a particular amount of finished goods, work-in-progress, and raw materials in stock. No matter how big or small the company, the goal is always to maximize profits. This is done through maximizing revenue and minimizing costs. The products that are in inventories are either accumulated for sale, in production, or in the form of raw materials that have not yet been used. Thus, a system employed by a company to manage its inventory investment might be described as inventory management. (Stevenson.2010). It entails keeping track of stock levels, estimating demand for the future, and determining when and how to place orders. (Aderimi and Salama 2010). An inventory system is a collection of policies and regulations that keep track of stock levels, decide when to restock, and specify the size of orders.One of a company's most crucial assets, particularly for manufacturing enterprises, is its inventory. In contrast to cash on hand and cash in banks, among others, Carter (2002) notes that 60 to 70 percent of the total funds used by many manufacturing companies are in the form of current assets, with inventory having the most significant components consisting of raw materials, work-in-progress, and finished goods.According to Kolias, Dimelis, and Filios' (2011) study, managing inventories for manufacturing companies should receive more focus among current assets due to the impact they have on output and profitability. They contend that poorly managed inventories frequently have a detrimental impact on a company's profitability and, in the long run, lead to an organization's liquidation. Since managing inventory is now considered to be a "necessary evil," managers must put out enough effort to avoid such a situation.The main objective of inventory management is to keep enough high-quality products in stock to meet client demands while simultaneously reducing the expense of maintaining inventory. Ehrhard and Brigham. Since it costs a lot of money to lock up capital in excess inventory, management must make an effort to make the best inventory investment decision. So, in this study, we look at the relationship between inventory management and financial performance of a few Nigerian manufacturing companies that are publicly traded.

1.2 Statement of the Problem

In the working capital structure of the majority of businesses, inventories hold the most strategic position. In any manufacturing company, effective inventory management protects the company from low production quality, displeased repeat consumers, lost profits, and good social responsibility. Even while some businesses frequently assert that they manage their inventory properly, several issues still exist, including supply shortages, a decline in productivity and profitability, and unsatisfied customers.Any company needs resources, and inventory is one of them. Because inventory is so rare, it needs to be managed well if it is to succeed. The price of obtaining these inventories is also crucial because having too few of them could result in a shortage and a manufacturing bottleneck, while having too many will tie up cash and increase the danger of obsolescence. In light of this, the study seeks to understand how inventory management affects the financial performance of Nigerian manufacturing companies.

1.3 Objectives of the Study

The broad objective of study is to access the effect of inventory management on performance of manufacturing firms in Nigeria. In specific terms, the study seeks to:

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i. determine the effect of cash conversion cycle on return of assets of selected firms in Nigeria.
ii. examine the effect of account receivable turnover on return of assets of selected firms in Nigeria.
iii. identify the effect of account payable turnover on return of assets of selected firms in Nigeria.

1.4 Research Hypotheses.

The following research hypotheses are in null form

i. There is no significant impact of cash conversion cycle on return of assets of manufacturing firms in Nigeria.
ii. There is no significant impact of account receivable turnover on return of assets of manufacturing firms in Nigeria.
iii. There is no significant impact of account payable turnover on return of assets of manufacturing firms in Nigeria.

Review of Related Literature

2.1 Conceptual Framework

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2.1.1 Concept of Inventory

Raw materials utilized in production as well as finished commodities that are offered for sale are both included in inventories. One of a company's most valuable assets is its inventory because turnover is one of the main ways it generates revenue and, consequently, profits for its shareholders. In a larger sense, inventory might include inputs like money, energy, people, equipment, and raw materials. It can also include inputs like parts, components, and finished things, as well as interim stages of the production process like partially finished products or work in progress. Although expensive and challenging to maintain, inventory is a need for offering excellent customer service. In order to maintain high levels of customer service while preventing excessive inventory levels that can drain funds and result in losses, inventory management tools are provided.

2.1.2 Types of Inventories

The following categories apply to inventories in manufacturing businesses. a. Raw materials are anything used in the production of completed products or the various parts that make them up. These can be created or obtained by a company directly, or they can buy them from a supplier. Additionally, it refers to the raw resources that a business uses as an input or resource to create its finished goods. In either case, raw materials are still regarded as a sort of inventory and must be handled, kept in a secure location, and properly recorded.

b. Work-in- Progress: These are components or unfinished goods that are actively being produced but are not yet ready for retail sales. Since the things that are being manufactured are not yet finished commodities and can be counted and documented in the books of account, it is typically utilized by businesses that manufacture products. c. Finished Goods: Products that are finished and ready to be used or sold are referred to as finished goods. The corporation may produce finished goods in-house or buy them as finished goods from a source. It is the final stage of the manufacturing process. The products are prepared for distribution, usage, or consumption. After this point, the seller is not required to process any more parts of the products.

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Maintenance, Repair, and Operations (MRO) inventory: This is an additional category of inventory that does not belong to the company's raw materials, works-in-progress, or finished goods. These inventories are maintained and reported as existing control measures. Such a collection is known as a tool inventory and includes things like safety gear or repair tools.

2.1.5 Concept of Inventory Management. The process of ordering, storing, using, and selling a company's inventory is referred to as inventory management. This covers the storage and processing of such products as well as the management of raw materials, components, and completed commodities. So, inventory management is a method for monitoring the movement of inventories. It begins with the purchase of commodities and storage of those items, and it goes on to the outflow of raw materials or stock to reach the manufacturing units, or to the outflow of raw materials or stock to reach the markets, as appropriate.Either a human procedure or an automated system can be used to complete it. Inventory management is a system that integrates information, transportation, acquisition, inspection, material handling, warehousing, packing, control of supply, and maintaining the security of inventory, according to Silver, David, and Rein (1998). Inventory management seeks to maximize the movement of commodities, information, and other relevant resources like people and energy from the point of origin to the site of final consumption. It also aims to identify and maintain the ideal levels of inventories.

2.1.6 Concept of Financial Performance: Performance refers to an organization's capacity to grow and manage its resources in a variety of beneficial ways to support competitive advantages (Iswatia&Anshoria, 2007). Firm performance can also be defined as how effectively a healthy organization uses its resources to produce income (Samina &Ayub 2013). It describes the process by which a company's resources, including people, materials, equipment, and money, are used to achieve organizational goals to the fullest. Performance and profit are sometimes used synonymously, yet they have distinct differences. Performance, as opposed to profit, refers to an organization's capacity to realize a return on all of the resources it uses to conduct business. Profit is an organization's total income earned. A term called "firm performance" describes an organization's capacity for doing business profitably. By utilizing the existing resources to meet the anticipated profit target, it gauges a company's level of efficiency. Financial performance primarily reflects the outcomes and results of the business sector, which demonstrate the sector's overall financial health over a given time period. It shows how well a company is using its resources to increase profits and shareholder wealth. Financial ratios are the most often used performance assessment in the fields of finance and statistical analysis, even if the evaluation of the firm's financial performance takes into consideration many other distinct types of metrics.

2.1.7 Measures of Financial Performance

The indicators listed below are frequently present in the financial statements mentioned above and are among the most crucial for managers and other critical organization stakeholders to comprehend. Gross Profit Margin I A profitability ratio called gross profit margin calculates the portion of revenue that remains after deducting cost of goods sold. Operating costs, interest costs, and taxes are not included in the cost of goods sold, which only includes the direct cost of production. In other words, a product's or line of products' gross profit margin is a measure of profitability that excludes accounting overheads.

Formula for Gross Profit Margin: (Revenue - Cost of sales) /Revenue x100. **ii. Net Profit Margin:** Net profit margin is a profitability ratio that measures what percentage of revenue and other outcome is left after subtracting all cost for goods sold, operating

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expenses, interests and taxes. Net profit margin differs from gross profit margin as measure of profitability for the business in general, taking into account not only the cost of goods sold but other expenses.Formula for Net Profit Margin: Net Profit / Revenue x 100.**iii. Working Capital**: Working capital is a measure of the business's available operating liquidity, which can be used to fund day to day operations.Formula for Working Capital: Current Assets - Current Liabilities.**iv. Current Ratio**: Current Ratio is liquidity ratio that helps you to understand whether business can pay its short term obligations- that is, obligations due within one year- with its current assets and liabilities.Formula for Current Ratio: Current Assets- Current Liabilities. **iv.Quick Ratio**: The quick ratio is also known as acid test ratio, it is another type of liquidity ratio that measures a business ability to handle short term obligations. The quick ratio uses only highly liquid current assets, such as cash, marketable securities, and accounts receivables, in its numerator. The assumption is that certain current assets like inventory are not necessarily to turn into cash.Formula for Quick Ratio: (Current Assets - Inventory) /Current Liabilities.

2.1.8 Objectives of Inventory Management

The objectives of inventory management may be discussed as follows:**a.Availability of Materials:** The first objective of inventory management is to make all types of materials available at all times whenever it is required by the production department in other to ensure that the flow of production may not be interrupted. It is therefore advisable to maintain a buffer stock of all essential items to move on the production on schedule .**b**.**Control of production level**: Proper inventory controls helps to increase and to maintain a buffer stock of raw materials to meet any eventuality in difficult times. c. **Economy in purchasing:** A proper inventory management brings several advantages and economy of scale in purchasing. Management makes every attempt to purchase the inventories in bulk and to take advantage of favorable market conditions. d.**Better customer services:** In order to meet the demand for the quality of goods, it is the responsibility of the concern to produce sufficient stock of finished goods at the proper time to ensure the execution of orders of customers. It will improve the image of the firm. e. **Inventory wastage:** Good inventory management will aim to reduce wastage, pilferage, obsolescence, and other costs.

2.1.9 Stages of Inventory Management: There are five stages of inventory management: **Purchasing:** This means buying raw materials, to turn to finished products, or buying products to sell on with no assembly required.**Production:** This stage involves processing the raw materials bought into finished goods available for a sale.**Holding stock*:*** This stage involves storing the raw materials before they are manufactured and the finished goods before they are sold.**Sales**: This stage involves getting the stock into the customers hand and taking payment.**Reporting***:* This involves knowing how much was put into the business and how much money it makes on each sale.

2.1.10 Inventory Costs: The five major components of cost are: **Ordering Costs:**Ordering costs include payroll taxes, benefits and the wages of the procurement department, labor costs etc. These costs are typically included in an overhead cost pool allocated to the number of units produced in each period.Transportation costs,Cost of finding suppliers and expediting orders, receiving costs, Clerical costs of preparing purchase orders, Cost of electronic data interchange.**Inventory Holding Costs:** This is simply the amount of rent a business pays for the storage area where they hold the inventory. This can be either the direct rent the company pays for all the warehouses put together or a percentage of the total rent of the area utilized for storing inventory. **Shortage Costs:** Shortage costs, also known as stock-out costs, occur when businesses become out of stock for various reasons. Some of the reasons might be as below:Late

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shipments costs, disrupted production costs, Customer loyalty and reputation-cost.**Spoilage Costs:** Perishable inventory stock can rot or spoil if not sold in time, so controlling inventory to prevent spoilage is essential. Products that expire are a concern for many industries. Industries such as the food and beverage, pharmaceutical, health care and cosmetic industries are affected by the expiration and use-by dates of their products. **Inventory Carrying Cost:** This is the lesser-known aspect of inventory cost. This cost requires a certain amount of calculation to understand the extent of its impact on profit and loss statement. Inventory carrying cost refers to amount of interest a business loss out on the unsold stock value lying in the warehouse.

2.1.11 Concept of Inventory Control: Inventory control, also called stock control, is the process of managing a company's inventory levels, whether that be in their own warehouse or spread over their locations. It comprises management of items from the time you have them in stock to their final destination. An inventory control system also monitors their movement, usage, and storage. Inventory control means managing your inventory levels to ensure that you are keeping the optimal amount of each product. Proper inventory control can keep track of your purchase orders and keep functional supply chain. Effective inventory control allows you to change those inventory/sales for the better.

2.1.12Inventory Management Techniques: Inventory Management techniques helps in tracking and controlling the inventory orders, their usage and storage along with the management of finished goods that are ready for sale. Inventory management is an important aspect of business that management cannot afford to ignore. There are various types of inventory management techniques that can help in efficient inventory management. They are as follow:**ABC analysis: It** is an inventory management technique where inventory items are classified into three categories namely, A, B and C. The items in the A category of inventory are closely controlled as it consists of high price inventory which may be less in number but are very expensive. The items in the B category are relatively lesser expensive inventory as compared to the A category and the number of items in the B category is moderate, so the control level is also moderate. The C category consists of a high number of inventory items that requires lesser investment, so the control level is minimum. ABC analysis stands for Always Better Analysis.**Just in Time Method**: In the Just in Time method of inventory, the company keeps only as much inventory as it needs during the production process. With no excess inventory in hand, the company saves the cost of storage and insurance. The company orders further inventory when the old stock of inventory is lose to replenishment. This is a little risky method of inventory management because a little delay in ordering new inventory can lead to stock out situation. Thus, this method requires proper planning so that new orders can be timely placed.**Economic Order Quantity (EOQ):** This technique focuses on deciding, regarding how much quantity of inventory should the company order at a particular time and when they should place the order. In this model, the store manager will reorder the inventory when it reaches the minimum level. EOQ cost and carrying cost incurred while placing the order. With the EOQ model, the organization is able to place the right quantity of inventory.**Minimum Safety Stocks:** The minimum safety stock is the level of inventory that an organization maintains to avoid the stock-out situation. It is the level when we pace new order before the existing inventory is over.

2.1.13Inventory Management Software: Many firms today, make use of computer application software in the management of inventory. Particularly manufacturing firms

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who operates at a corporate level should embrace the use of computers.Inventory management software is a software that is used for tracking inventory levels, orders, sales, and deliveries it can also be used by other manufacturing industry to create a work order, bill of materials and other related documents. Companies used inventory management software to avoid products, over stock and outages. It is a tool for organizing inventory data that before was generally stored in hard copy form or in spreadsheets. Choosing an inventory management system that is right for your business can be a tricky process. But here are few pillar features of good inventory.Real-time-tracking: Syncs a live inventory figure across all sales channels and warehouse.Forecasting:Uses pat sales data to project estimated inventory requirements into the future.Purchasing: Helps manage all suppliers and purchase orders for quick and easy stock replenishment. Cloud-based: Accessed from anywhere with data never being overwritten by team members making changes.

2.2 Theoretical Framework.

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2.2.1 Theory of constraints

This theory emphasizes focus on effectively managing the capacity and capability of these constraint to improve productivity and this can be achieved by manufacturing firms and applying appropriate inventory control practices. Theory of constraints is a methodology whose basis is applied to production for the minimization of the inventory (Cooper &Eilram 1993). In view of the fact that this study examines the effect of inventory control 0n the performance of manufacturing firms, this study therefore settles for this theory. **2.2.2 Empirical Review**

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Inventory management and financial success have been the subject of several studies. In their 2019 study, Kolawole, Akomolafe, and Olusipe used International Breweries PLC as a case study to assess the link between inventory control and manufacturing companies' profitability in Nigeria. The study employed gross profit as a stand-in for profitability (the dependent variable), while raw material, work-in-progress, and finished goods inventories were only a few of the inventory management-related variables that were used as explanatory variables to represent inventory management. The company's annual reports from 2002 to 2011 were used to gather secondary data for the study.

As a statistical tool for data analysis, they used straightforward linear regression procedures. The findings demonstrated that inventory management had a significant impact on International Breweries PLC's profitability in Nigeria. Ndubuisi et al. (2018) looked at the connection between inventory control and the financial success of breweries in Nigeria from 2010 to 2016. The study employed inventory conversion period as the independent variable and ROA, revenue growth, and ROE as proxies for financial performance (the dependent variable). The NSE fact book and the annual reports of the seven sampled brewers were used to compile secondary data for the study. For data analysis, they used the Strata version 13 software and the OLS regression approach. The findings showed a substantial positive association between inventory conversion period, ROA, and revenue growth, but a positive but insignificant relationship between inventory conversion period, and ROE. For the years 2007 to 2014, Bawa, Asamoh, and kissi (2018) looked into how inventory management affected the performance of companies listed on the Ghana Stock Exchange. For example, they used return of assets and inventory conversion period as stand-ins for inventory management (an independent variable) and performance (a dependent variable), respectively.

3.1 Methodology

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The research design used in the study was ex post facto. 56 manufacturing companies that are publicly traded on the Nigerian Exchange Group make up the study's sample. The financial statements of two chosen companies in Nigeria are examined cross-sectionally in this study. Two specified, hand-picked manufacturing companies in Nigeria make up the sample size. Information was gleaned from the financial statements of 11 specialized Nigerian manufacturing firms. Other sources to enrich the literature included published reports on inventory management, published scholarly papers, textbooks and other materials in existence adopted in explaining the researched variables. The names of the company are attached in appendix I for perusal.This study used the Panel regression to examine the effect of inventory management and financial performance of selected listed manufacturing firms in Nigeria**.** This study was designed to cover a period of 16 years (2012-2021). The results of the data analysis and hypothesis testing will be done using Stata 13 Computation, to present reliable evidence upon which this study will draw conclusions.

3.2 Model Specification

This study examines the impact of inventory management of selected listed manufacturing firms in Nigeria. In order to accomplish this, three variables were identified in the study and these are dependent and independent variables include; Cash conversion cycle, Account Receivable Turnover, Account Payable Turnover. On the other hand, the dependent variable is financial performance.

The model is shown below:

$Y = a+bx$

$CCC= a+b\ ROA$

$ART = a+b\ ROA$

$APT= a+b\ ROA$

Where;

Y= Financial performance

Y1= Inventory Management

X1= CCC

X2= ART

X3= APT

Where:

IM= Inventory Management

CCC= Cash Conversion Cycle

ART= Account Receivable Turnover

APT= Account Payable Turnover

FSZ = Firm size (log of total assets) as control variable

Mathematical form:

$Y = a+bx$

$ROA= a+b\ CCC$..... (1)

$ROA= a+b\ ART$.....(2)

$ROA= a+b\ APT$..... (3)

In Econometric form

$Y= \beta o + \beta 1x + e/y$

$ROA= \beta o + \beta 1\ CCCit+ \beta 2\ ARTit+ \beta 3\ APTit+ FSZit +$ …….. (4)

4.0 Data Presentation, Analysis, and Discussion of Findings

4.1 Introduction

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This chapter presents the data extracted from the annual financial statement of the selected listed manufacturing firms that are sampled for the study. An analysis of the data is done using panel regression method. Finally, the stated hypotheses are tested, and the discussion of the result from the tested hypotheses is done in this chapter of the study.

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4.2 Data Presentation and Analysis

In this section, analyses of the data presented in appendix I of the study are done with the aid of Stata. The analysis of data is presented in the subsequent sections: This section of the chapter presents the descriptive statistics of the data extracted from the annual financial statement of the listed manufacturing firms that are sampled for the study. The correlation analysis is done in the subsequent section, as well as the regression analysis.

4.2.1 Descriptive statistics

The descriptive statistics for both the dependent and independent variables are presented in Table 1 below:

Table 1: Descriptive statistics table

	ROA	CCC	ART	APT	FSZ
Mean	0.167245	82.50909	0.4139963	0.3478784	6.211606
Maximum	0.958652	178	0.982806	0.9157462	7.96116
Minimum	0.001854	-12	0.0699947	0.0170208	5.065863
Std. Dev.	0.191358	36.49224	0.2240859	0.2109975	0.5934503
Skewness	0.4000	0.8139	0.1385	0.9009	0.1048
Observations	110	110	110	110	

Source: Stata Output

Table 1 presents the descriptive statistics of all the variables. The number of observations for the study is 110.

Return on assets (ROA) recorded a minimum and maximum value of 0.001854 and 0.958652. ROA also recorded a mean of 0.167245 and a standard deviation of 0.1911358. Cash Conversion Cycle (CCC) reveals a mean of 82.50909 with a deviation of 36.49224 days. CCC further revealed a minimum (-12) and maximum (178) number of days respectively. Account Receivable Turnover ratio (ART) reveals a mean of 0.4139963 with a deviation of 0.2240859 ratio. ART further revealed minimum (0.0699947) and maximum (0.982806) ratios respectively. Account Payable Turnover ratio (APT) reveals a mean of 0.3478784 with a deviation of 0.2109975 ratio. APT further revealed minimum (0.0170208) and maximum (0.9157462) ratios respectively. Finally, Firm Size (FSZ) reveals a mean log of 6.211606 with a deviation of 0.5934503. FSZ further revealed a minimum and maximum value of 5.065863 and 7.96116 respectively.

To test for stationarity of data, the Skewness statistics are used. The ratio of skewness to its standard error can be used as a test of normality. According to Berenson and Levine, (1999) you can reject normality if the ratio is less than -2 or greater than +2. A large positive value for skewness indicates a long right tail; an extremely negative value indicates a long left tail; which is an indication of non-normality of data. The data set for all the variables reveal skewness statistic values that are between the range of -2 and +2 which means that all the data values are within the accepted skewness range for normality thus all the data are normalized.

4.2.2 Data Diagnostic Test

4.2.2.1 Correlation Analysis

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This section of the chapter presents in the table below the result of the correlation analysis between the independent variables.

Table 2: Correlations table

	CCC	ART	APT
CCC	1.000		
ART	-0.1180	1.000	
APT	-0.1588	0.5031	1.000

Source: Stata output

Table 2 shows the correlation for all the independent variables to ensure the test for multicollinearity of the independent variable since they consist of unranked data. Correlation considers two variables at a time to determine how they relate to each other. These types of checks are necessary because high correlation cause problems about the relative contribution of each predictor to the success of the model (Guajariti& Sangeeta, 2007). The correlation matrix above shows the absence of multicollinearity among the explanatory. All the variables show a low correlation with the highest correlation estimated at 0.70 between ROA and FA. Correlation statistics that are above 0.75 are considered harmful for analysis (see Gujarati and Sangeeta, 2007) but this is not the case with the current study.

4.2.3 Multi-Collinearity Test

To avoid running a spurious regression, a stationarity test is carried out to ensure that the variables employed in this study are mean-reverting i.e. stationary. For this purpose, the Variance Inflation Factor.

Table 3: Multi-collinearity

TEST	**TEST STAT**	**FRQ Model**	
Multicollinearity	Variance Inflation Factor (VIF)	1.02<10 Mean Centered	Appropriate

Source: Stata output

Results for the ROA model in table3 above reveal VIF statistics values of less than 10 for the model, which proves that the set of independent variables data are free from multicollinearity issues. This means that the regression result can be adopted given the fact the model is robust enough to ensure that the allowable error is within or less than the accepted limit of 0.05.

4.2.4 Regression of the estimated model

This section of the chapter presents the results produced by the three model summaries for further analysis;

Table 4: Pre regression estimation test

	Statistic	**P-value**
i.	Hausman Test	0.6539
	Decision	Random effect model

Source: STATA Output

To enable the study to choose between the pooled model, fixed-effect model, and the random effect model, the Hausman test is conducted with the comparable results/tables placed in Appendix II at the end of the study for perusal. The result of the Hausman correlation test from table 4 above shows a probability value of 0.6539>0.05 which is not significant thus informs the preference of the random-effect model from the Hausman test. Thus, the random effect model is analyzed below:

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Table 5: ROA model summary

Variable	Coefficient	Prob.
C	1.185478	0.001
CCC	-.0000445	0.896
ART	.0928152	0.294
APT	.1201148	0.130
FSZ	-.1762466	0.002
R-squared within	0.1641	
R-squared between	0.1103	
Overall R-squared	0.1065	
Wald chi2	17.57	
Prob(chi2-statistic)	0.0015	

Source: Stata output

Table 5, presents the regression result between CCC, ART, APT and ROA controlled FSZ. From the model summary table above, the following information can be distilled.

The R^2 within which measures the level of variation of the dependent variable caused by the independent variables within each panel group stood at 0.1641. This means that, within each group, the R^2 value of approximately 0.1641 indicates that 16.41% of the variation in the return on assets (ROA) of listed manufacturing firms can be explained by a variation in CCC, ART, and APT while the remaining 83.59% (i.e. 100-R^2) could be accounted by other variables not included in this model.

The R^2 between the panel groups reveals a statistic of 0.1103. This means that there is 0.0583(0.1641-0.1103) variation between the levels at which each panel group CCC, ART, and APT data contribute to variation in ROA data of the group panel data.

The overall R^2 Reveal a statistic of 0.1065. This means that, the overall manufacturing firms' CCC, ART and APT contribute to 10.65% variation in the return on assets (ROA) of listed manufacturing firms while the remaining 90.35% (i.e. 100-R^2) could be accounted by other variables not included in this model.

The regression results as presented in table 4 above shows that when all the independent variables are held stationary or without the variable intercept model; the ROA variable is estimated at 1.185478. This simply implies that when all independent variables are held constant, there will be increase in the *ROA* of listed manufacturing firms up to the tune of 1.185478 units occasioned by factors not incorporated in this study. Thus, a unit increase in CCC will lead to decrease in ROA by 0.004%. But a unit increase in ART will lead to increase in ROA by 9%. Also, a unit increase in APT will lead to increase in ROA by 12%.

Finally, the result shows that there is a significant variation of Wald statistics (17.57) at a probability value of 0.0015 which means the model as a whole is statistically fit.

4.2.5 Test of Hypotheses

The hypotheses outlined in chapter one of the study are hereby tested;

***HO_1**: Cash conversion cycle does not significantly affect return on assets of listed manufacturing firms in Nigeria.*

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To test the significance of the model, the decision rule stated in chapter 3 is used. Since the calculated probability value for CCC (0.896>0.05) against ROA is greater than the accepted probability value of 0.05. The null hypothesis is accepted and the alternative rejected thus; cash conversion cycle does not significantly affect return on assets of listed manufacturing firms in Nigeria.

***HO_2**: Account receivable turnover does not significantly affect return on assets of listed manufacturing firms in Nigeria.*

To test the significance of the model, the decision rule stated in chapter 3 is used. Since the calculated probability value for ART (0.294>0.05) against ROA is greater than the accepted probability value of 0.05. The null hypothesis is accepted and the alternative rejected thus; account receivable turnover does not significantly affect return on assets of listed manufacturing firms in Nigeria.

***HO_3**: Account payable turnover does not significantly affect return on assets of listed manufacturing firms in Nigeria.*

To test the significance of the model, the decision rule stated in chapter 3 is used. Since the calculated probability value for APT (0.130>0.05) against ROA is greater than the accepted probability value of 0.05. The null hypothesis is accepted and the alternative rejected thus; account payable turnover does not significantly affect return on assets of listed manufacturing firms in Nigeria.

4.2.6 Discussion and Interpretation of Results

Three research objectiveswere set to ascertain the effect of inventory turnover on profitability of listed manufacturing firms in Nigeria. The study hypotheses tested revealed that, cash conversion cycle, account receivable turnover, and account payable turnover does not significantly affect return on assets of listed manufacturing firms in Nigeria. The study findings conform to that of Thogori and Gathenya (2014) who carried out an investigation on the role of inventory management on customer satisfaction among manufacturing firms in Kenya. The research was carried out at Demonte Kenya since the company has a well laid down supply chain inventory information sharing system that is linked to the customer in real time to enhance inventory management. A census was carried on all 50 employees at Demonte Kenya who were involved in the supply chain management activities. Questionnaire, interview guide and observation guide were used to collect the data. The result revealed that the entire respondent indicated that the company experienced shortages of inventory. They therefore concluded that manufacturing firms had poor inventory management systems and that had greatly impacted on their ability to satisfy their customers' needs thus resulting to a lower sale turnover.

Summary, Conclusion and Recommendations

5.1 Summary of Findings

The following are the summary of the major findings of this study arrived at through the test of the research hypotheses earlier formulated in this study.Cash conversion cycle has a negative relationship with return on assets of listed manufacturing firms in Nigeria. Also, Cash conversion cycle does not significantly affect return on assets of listed manufacturing firms in Nigeria. Account receivable turnover has a positive relationship with return on assets of listed manufacturing firms in Nigeria. But account receivable turnover does not significantly affect return on assets of listed manufacturing firms in

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Nigeria. Account payable turnover has a positive relationship with return on assets of listed manufacturing firms in Nigeria. But account payable turnover does not significantly affect return on assets of listed manufacturing firms in Nigeria.

5.2 Conclusions

Based on the findings of this study from the test of the three research hypotheses earlier formulated in the study, the researcher has therefore come to the following conclusions outlined in respect to each hypothesis:Cash conversion cycle has a negative significant effect on return on assets of listed manufacturing firms in Nigeria.Account receivable turnover has a positive significant effect on return on assets of listed manufacturing firms in Nigeria.Account payable turnover has a positive significant effect on return on assets of listed manufacturing firms in Nigeria.

5.3 Recommendations

In consonance with this study's findings, the following recommendations become imperative:Manufacturing firms in Nigeria should speed up conversion of finished goods into sales. This can be done through putting in place good marketing strategies that ensure quick sales of products to attract more revenue and profit.The firms should ensure that only credit worthy customers are given goods on credit to ensure prompt account receivables. This will boast quick returns and increase the profit of the firms.Also, the manufacturing firms should improve on timely payment of credit purchases. This will enable suppliers have more confidence in entrusting more raw material to the firms on credit which will boast their inventories as well increase sales and profit.

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